МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ
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ИНОСТРАННЫЙ ЯЗЫК.
АНГЛИЙСКИЙ ЯЗЫК ДЛЯ ПРОФЕССИОНАЛЬНЫХ ЦЕЛЕЙ ДЛЯ СТУДЕНТОВ-ТЕХНОЛОГОВ НАПРАВЛЕНИЯ «СТАНДАТИЗАЦИЯ И МЕТРОЛОГИЯ»

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Даны материалы по темам, изучаемым в строительном вузе, а также тексты, содержащие информацию о стандартизации в соответствии с ГОСТом. Представлены упражнения, позволяющие понимать тексты и задания к ним.

Учебное пособие подготовлено на кафедре «Иностранные языки» и предназначено для студентов, обучающихся по направлениям подготовки 27.03.01 «Стандартизация и метрология», 08.03.01 «Строительство».

ПРЕДИСЛОВИЕ

Пособие содержит тексты по направлению подготовки «Стандартизация и сертификация». Имеются задания для контроля понимания прочитанного материала. Тексты взяты из английских и американских источников. Они подвержены адаптации для снятия трудностей понимания. Содержание текстов способствует профессионально-направленному обучению студентов неязыкового вуза. Тексты предназначены для работы со студентами 1-го и 2-го курсов технологического факультета.

PART I. TEXS FOR COMPREHENSIVE STUDY

STANDARTIZATION

I. Read the texts and learn the new words:

to establish – учреждать
to define – определять
to apply – применять
approach – подход
benefit – преимущество
in particular – особенно
term – термин, условие
designation – обозначение
significant – значительный
influence – влияние
rate of development – уровень развития
to aim – стремиться
application – применение
achievement – достижение
to link – связывать
enterprise – предприятие
to improve – улучшать
to govern – управлять
interchangeability – взаимозаменяемость
to ensure – обеспечивать

1. The definition of standartization

Skim the text to understand what it is about. Time your reading. It is good if you can read it for about two minutes (110 words per minute).

Standartization is the process of establishing and applying standards. Standardization is defined by the International Organization for Standartization as "the process of formulating and applying rules for an orderly approach to a specific activity for the benefit and with the cooperation of all concerned, and in particular for the promotion of optimum overall economy, taking due account of functional conditions and safety requirements." Standardization can be applied to specific products, as well as to, for example, norms, requirements, methods, terms, and designations commonly used in international trade and in science, engineering, industry, agriculture, construction, transportation, culture, public health, and other spheres of the national economy.

Standardization has a significant influence on the rate of development and level of production. Based on the latest achievements of science, technology, and practical experience, standardization not only determines in large part the level of production attained but also serves as one of the stimul to progress in science and technology.

2. Standardization in the USSR

I. Read the texts and learn the new words:

reflect – отражать
chairmanship – председатель
the Council of Labor and Defense – совет труда и обороны
wheat – пшеница
breeding – разведение
strains of grains – зерновых культур
assume – предполагать
managerial levels – управленческие уровни
guideline – руководящий принцип, норматив
wording – формулировка
drawing up – составление
forecast – прогноз
subassembly – подсистема
uniformity – равномерность
reliability – надежность
steady – стабильный
the State Mark of Quality – государственный знак качества
evaluating – оценка
interchangeability – взаимозаменяемость
inter – в числе

II. Read and translate the text using the new words:

In the USSR, standardization is closely linked to the system of planning and management of the national economy. It is one of the elements of the state policy in the field of technology.

Under a planned socialist economy, standardization plays an active role in the management of the national economy. This role is reflected in the activities of state bodies, enterprises, and organizations concerned with the establishment and application of regulations, norms, and requirements aimed at accelerating scientific and technical progress, raising labor productivity, and improving product quality.

The Soviet government's first document on standardization was the decree of Sept. 14, 1918, from the Soviet of Peoples' Commissars of the RSFSR" On

the Institution of the International Metric System of Weights and Measures". On Sept. 15, 1925, the Soviet of Peoples' Commissars of the USSR adopted a resolution on setting up a committee for standardization under the chairmanship of V. V. Kuibyshev, which was to be placed under the Council of Labor and Defense. On May 7, 1926, this committee adopted the first all-Union standard, OST-1 Wheat: Breeding Strains of Grains: Nomenclature, which assumed the force of law. In the years 1936-40, peoples' commissariats were also developing and adopting standards; in July 1940 this work was taken over by the All-Union Committee for Standardization under the Soviet of Peoples' Commissars of the USSR, and in1948 this committee became part of the State Committee of the Council of Ministers of the USSR on the Introduction of Advanced Technology into the National Economy (Gostekhnika SSSR). In the years of 195Í-53, the Administration for Standardization under the Council of Ministers of the USSR was the country's central organ for standardization, a function taken over in 1953–54 by the Administration for Standardization of the State Planning Committee (Gosplan) of the USSR. In 1954 standardization became the work of the Committee for Standards, Measures, and Measuring Instruments under the Council of Ministers of the USSR, which in 1970 was reorganized as the State Committee for Standards (Gosstandart SSSR) under the Council of Ministers of the USSR. The network of agencies and departments of Gosstandart SSSR includes republic administrations, centers for standardization and metrology, scientific research institutes, and the laboratories of the state inspectorate on standards. As of 1975, there were more than 600 main organizations in the various branches of the economy concerned with standardization, including scientific research institutes in the ship building, aerospace, electrical-engineering, electronics, and radio-engineering industries.

The USSR has a State System of Standardization that coordinates the work being done on standardization at all managerial levels of the national economy. The system's rules and guidelines set forth the primary objectives and tasks of standardization, the proper organization, planning, and methodology for work on standardization, the procedures for developing, introducing, circulating, and updating normative technical documents, and the procedures to be followed by the state inspectorate and control boards in seeing that the documents are introduced and followed.

The system also concerns itself with the condition and use of measuring equipment, the objects of standardization, and the categories and types of standards. It ensures that the rules for structuring, wording, and drawing up standards are uniform. The planning of work on standardization is part of the system of state planning and is coordinated with plans for scientific research, testing and design work, and experimental projects.

Standardization in the USSR has a number of tasks. It establishes the quality and technical requirements for manufactured goods, raw materials, semi finished products, and assembly components; it sets the norms, requirements, and

methods that govern the design and production of manufactured goods and that ensure optimal quality and eliminate a needless multiplicity of varieties, brands, and sizes. It also seeks to develop standardized units and assembly procedures for industrial products as a key to specialization of production and full mechanization and automation of production processes and to increase the interchangeability, efficiency, and repair ability of manufactured articles.

Standardization ensures uniformity and reliability in measurements throughout the country, and it creates and refines state standards for physical units and highly precise method sand devices for measurements; in addition, it establishes uniform systems of documentation and systems for the classification and codification of technical and economic information. Standardization establishes the terms and designations used in important areas of science and technology and in certain branches of the national economy and provides a system of labor safety standards. It also sets guidelines for environmental protection and for improving the use of natural resources and establishes favorable conditions for foreign trade and cultural, scientific, and technical ties.

Socialist standardization is based on the methods of advanced and integrated standardization. The principle of advanced standardization involves setting norms and requirements that are higher than presently attained levels; the assumption here is that these norms and requirements will, according to forecasts, be optimal in the ensuing period.

Depending on the actual conditions, indexes, norms, and characteristics are established in the prospective (graduated) standards in the form of steps in quality with differentiated introduction dates.

The principle of integrated standardization involves matching the indexes of the interrelated components of the standardized object and coordinating the times for the introduction of the standards. Integration of standardization is ensured by developing programs of standardization that include articles, subassemblies, parts, semi finished items, raw and processed materials, technical devices, and methods for organizing and preparing for production. Integrated standardization, encompassing all aspects of the manufacture and use of products, permits coordination in production between different branches of the economy and provides for complete and optimal satisfaction of the requirements of organizations and enterprises concerned.

As of early 1975, there were more than 20,000 state standards in effect in the USSR, as compared with approximately 6,000 in 1940, covering the most important types of industrial and agricultural products. In addition, there were more than 6,000 republican standards, 15,000 standards with application in a particular branch of industry, and 100,000 technical specifications recorded at Gosstandart SSSR.

Inter industrial systems of standards of national importance include the Uniform System of Design Documentation, the Uniform System of Technological Preparation for Production, and the Uniform System for the

Classification and Codification of Technical and Economic Information. In order to ensure a steady increase in the quality of products manufactured in the USSR, procedures have been introduced whereby items are given quality ratings of highest, first, or second, and the State Mark of Quality is placed on goods of high quality. Gosstandart SSSR develops and adopts the scientific and technical documentation on procedures for evaluating the quality level of products and sees that the conditions for certification are met.

III. Answer the following questions to the text:

1) What is standardization in the USSR closely linked to?
2) What spheres of economy does standardization play an active role?
3) What was the Soviet government's first document on standardization?
4) What standard did the first committee for standardization adopt?
5) When did standardization become the work of the Committee for Standards, Measures, and Measuring Instruments?
6) The USSR has a State System of Standardization that coordinates the work being done on standardization at all managerial levels of the national economy, doesn't it?
7) What is the main task of standardization?
8) What items do the programs of standardization include?
9) What are the differences between the programs of standardization of 1940 and 1975?
10) What items does the industrial systems of standards include?
11) Gosstandart SSSR develops and adopts the scientific and technical documentation on procedures for evaluating the quality level of products and sees that the conditions for certification are met, doesn't it?

IV. Continue the following sentences:

1) In the USSR, standardization is closely linked to …
2) This role is reflected in the activities of …
3) As of 1975, there were more than 600 main organizations …
4) Standardization in the USSR establishes …
5) The principle of advanced standardization involves …
6) Standardization ensures uniformity and reliability in …
7) The principle of integrated standardization involves …
8) Inter industrial systems of standards of national importance include …
9) Gosstandart SSSR develops and adopts the scientific and technical documentation …
10) Standardization establishes the terms and designations used in important areas of ...

3. Standardization within the Council for Mutual Economic Assistance (COMECON)

I. Read the texts and learn the new words:

Comprehensive Program – комплексная прграмма
Further Extension – дальнейшее развитие
to seek – искать, стремиться
to conform – соответствовать
application – применение
decisive – решающее
influence – воздействие
competitive position – конкурентноспособность

Skim the text to understand what it is about. Time your reading. It is good if you can read it for about five minutes (110 words per minute).

Standardization within COMECON is coordinated with the objectives of the Comprehensive Program for Further Extension and Improvement of Cooperation and the Development of Socialist Economic Integration of the CMEA Member Countries. Work in standardization is done by the Standing Commission on Standardization, specialized standing commissions, the COMECON Institute of Standardization, and the standardization department of the COMECON secretariat. The work, which seeks to create systems within COMECON of normative technical documents, has resulted in a system of normative technical documentation on standardization, an automated information and control system for standardization and metrology, a uniform system of planning and design documentation, and a uniform system of tolerances and fittings. Another goal of standardization is the creation of integrated standards for the products traded among COMECON countries.

The norms and requirements of COMECON standards conform to international standards. As of Jan. 1, 1975, 4,900 COMECON recommendations on standardization and 120 COMECON standards had been adopted. The 28th session of COMECON (June 21, 1974) ratified the Statute on the COMECON Standard and approved a convention on the direct (immediate) application of COMECON standards, which in turn was ratified by the Presidium of the Supreme Soviet of the USSR by a decree dated Sept. 17, 1974. The development and application of COMECON standards has had a decisive influence on the process of socialist economic integration and on the international socialist division of labor, the level and quality of production, and the competitive position of socialist products in world markets; standards have also had a pronounced economic effect. The use of COMECON standards within each of the member states has brought about a harmonization of the national systems of standardization.

4. Standardization in capitalist countries

I. Read and translate the without a dictionary:

National organizations carry out the work in standardization in capitalist countries. In most industrially developed countries, the organizations are nongovernmental and include associations, societies, and institutes whose members are firms, companies, corporations, and private individuals. In many cases, the organizations receive financial support from the government. In Japan, Italy, Mexico, and certain other countries, there are governmental organizations concerned with standardization.

The overwhelming majority of national standards do not have the force of law; exceptions include the standards pertaining to safety equipment and the equipment used in public health and environmental protection. Firms and companies also develop and use trade standards, which take into account demand and competition in domestic and foreign markets. International standards are coming into wider use.

II. Find Russian equivalents to the following international words and combinations. Pay attention to the pronunciation:

National organizations, standardization, organizations, associations, institutes, financial support, public, protection, firms, companies, international standards.

5. International standardization

I. Read and translate the without a dictionary:

Standardization here is linked to the development of multilateral scientific, technical, and economic cooperation. The 1970's have witnessed an intensive development of work in international standardization. In add it into national organizations, there are more than 300 international and regional organizations (1975) working on questions of standardization, metrology, and product quality. Major international organizations for standardization include the UN Economic Commission for Europe, the International Organization for Standardization, and the International Electro technical Commission.

The international standards and recommendations developed by these organizations establish indexes corresponding to current scientific technical requirements regarding the quality, reliability, safety, and other crucial features and characteristics of products exchanged in international trade. The standards and recommendations also stipulate the methods and devices to be used in testing and certifying materials and goods. The application of international standards promotes broader scientific, technical, economic, and trade ties.

International standards are extensively used in developing national standards, which permits a significant reduction in the time and cost of establishing standards and has a pronounced economic effect.

II. Find Russian equivalents to the following international words and combinations. Pay attention to the pronunciation:

Technical, economic cooperation, national organizations, regional organizations, metrology, product, Economic Commission, recommendations, methods, economic effect.

6. The Construction Specifications Institute

I. Read the texts and learn the new words:

to pertain – относиться, касаться
guidelines – основные принципы
to author – создать
masonry – кирпичная кладка
finishes – отделка
life cycle – жизненный цикл
maintenance – обеспечение
drawings – графические работы
software – программное обеспечение
to launch – запустить
eventually – окончательно
to facilitate – облегчить, способствовать
database – база данных
comprehensive questionnaire – подробная анкета
estimating – оценка
streamlined – обтекаемый
interoperability – совместимость
nationwide – по всей стране

II. Read and translate the text using the new words

The Construction Specifications Institute (CSI) is an organization that keeps and changes the standardization of construction language as it pertains to building specifications. CSI provides structured guidelines for specification writing in their Project Resource Manual, (formerly called the Manual of Practice (MOP)).

CSI authored MasterFormat, which is an indexing system for organizing construction data, particularly construction specifications. For many years MasterFormat consisted of 16 Divisions of construction, such as Masonry,

Electrical, Finishes, or Mechanical. In November 2004, Master Format was expanded to 50 Divisions, reflecting the growing complexity of the construction industry, as well as the need to incorporate facility life cycle and maintenance information into the building knowledge base. In this way, Master Format will eventually help facilitate Building Information Modeling (BIM) to contain project specifications. However, current technology is unable to handle specifications to the degree drawing information is able to be referenced, displayed, quantified and other benefits of BIM. For example integrated systems, industry standards and methods that may not be shown in the drawings (because they are typically explained in the specifications) do not fit neatly within current BIM libraries.

The MasterFormat standard serves as the organizational structure for construction industry publications such as the Sweets catalog with a wide range of building products, and MasterSpec, a popular specification software. MasterFormat helps architects, engineers, owners, contractors, and manufacturers classify how various products are typically used. Nearly all CSI approved sections also include performance and safety requirements generated by agencies such as the American Society for Testing and Materials (ASTM), Occupational Safety and Health Administration (OSHA), and numerous other federal and professional organizations.

In November 2009, CSI launched GreenFormat, an online database organizing sustainable product attributes. Manufacturers in the construction industry can list product information based on 5 categories in an online comprehensive questionnaire. Designers, specifiers, and building constructors can find product information which is organized by MasterFormat divisions and titles.

CSI's Uniform Drawing System comprises the largest part of the National CAD Standard (NCS), together with the American Institute of Architects (AIA)'s CAD Layer Guidelines, and Tri-services Plotting Guidelines. Administered by the National Institute of Building Sciences (NIBS), the NCS coordinates these CAD-related publications to allow consistent and streamlined communication among owners and design/construction teams.

In November 2010, CSI acquired Building Systems Design (BSD) to help advance software tools for specifications development and communication of building information across the building team. BSD is a software firm that is a leading developer of commercial master specifications and construction cost estimating software. BSD is involved in the development and maintenance of several of CSI format documents including MasterFormat, UniFormat, and OmniClass, all of which relate to specifications and cost estimating.

Founded in 1983, BSD maintains and supports advanced specification writing, cost estimating and BIM interoperability products used by thousands of architects, engineers and design professionals nationwide.

III. Answer the following questions to the text:

1) What does the abbreviation CSI mean?
2) What does the Construction Specifications Institute provide?
3) What system does CSI create?
4) Who does MasterFormat help?
5) Say a few words about MasterFormat software.
6) When was GreenFormat launched?
7) What does the abbreviation BSD mean?
8) BSD is a software firm that is a leading developer of commercial master specifications and construction cost estimating software, isn't it?

IV. Make a summary of this text.

GOST STANDARD AND TECHNICAL SPECIFICATIONS

I. Read and learn the new words:

abbreviation – аббревиатура
to stand for – означать
promotion – продвижение
weight – вес
measure – измерения
objective – цель
requirement – требование
ferrous metals – черные металлы
wheat – пшеница
consumer goods – товары народного потребления
to approve – доказать
enterprise – предприятие
valid – действительный
Labor Safety – охрана труда
to obey – подчиняться
obligatory – обязательный
to permit – разрешать
to apply – применять
to conform – соответствовать
to absorb – поглощать
community – сообщество

II. Read and translate the text:

The abbreviation GOST (SUST) (eng.) stands for the State Union Standard. From its name we learn that most of the GOST standards of the Russian

Federation came from the Soviet Union period. Creation and promotion of the Union Standards began in 1918 after introduction of the international systems of weights and measures.

The first body for standardization was created by the Council of Labor and Defense in 1925 and was named the Committee for Standardization. Its main objective was development and introduction of the Union standards OST standards. The first OST standards gave the requirements for iron and ferrous metals, selected sorts of wheat, and a number of consumer goods.

Until 1940 Narcomats (People's Commissariats) had approved the standards. But in that year the Union Standardization Committee was founded and the standardization was redirected to creation of OST standards.

In 1968 the state system of standardization (SSS) as the first in the world practice. It included creation and development of the following standards:

GOST – State Standard of the Soviet Union;

RST— Republican standard;

IST — Industrial Standard;

STE — Standard of an Enterprise.

The level of technical development as well as the need for development and introduction of informational calculating systems and many other factors lead to creating complexes of standards and a number of large general technical standard systems. They are named inter-industrial standards. Within the state standard system they have their own indexes and the SSS has index 1. Nowadays the following standard systems (GOST standards) are valid:

USCD — The Uniform System of Constructor Documentation (index 2);

USTD — The Uniform System of Technological Documentation (3);

SIBD — The System of Information-Bibliographical Documentation (7);

SSM – The State System of Providing the Uniformity of Measuring(8);

SSLS— The System of Standards of Labor Safety(12);

USPD — The Uniform System of Program Documentation (19);

SSERTE — The System of Standards of Ergonomic Requirements and Technical Esthetic.

The USCD and USTD systems take special place among other inter-industrial systems. They are interrelated and they formulate requirements for general technical documentation in all industries of economy.

The task of harmonization of Russia's standards and the GOST standards was set in 1990 by the Soviet Council of Ministers at the beginning of the transit to market economy. At that time they formulated a direction that obeying the GOST standards may be obligatory or recommendable. The obligatory requirements are the ones that deal with safety, conformity of products, ecological friendliness and inter-changeability. The Act of the USSR Government permitted applying of national standards existing in other countries, international requirements if they meet the requirements of the people's economy.

During the past years a large number of GOST standards were developed and approved. Nowadays there is a process of their revision so that they conform international standard requirements. As the base is the system of international standards ISO, in Russia they created series of Russian standards such as GOST ISO 9001 or GOST ISO 14001, which absorbed the best developments of the world community but they also consider the Russia's specific.

III. Answer the following questions:

1. What does the abbreviation GOST mean?
2. When did creation and promotion of the Union Standards begin?
3. Who was the first body for standardization created by?
4. What was its main objective?
5. What were the requirements of the first OST standards?
6. What were the standards of the state system of standardization in 1968?
7. What modern GOST standards do you know?
8. The task of harmonization of Russia's standards and the GOST standards was set in 1990, wasn't it?
9. What are the obligatory requirements of the GOST standards?
10. What process does take place nowadays?

IV. Is it true or false?

1. The abbreviation GOST stands for the State Union Standard.
2. Creation and promotion of the Union Standards began in 1919 after introduction of the international systems of weights and measures.
3. The first OST standards gave the requirements for steel, oil, selected sorts of oats, and a number of consumer goods.
4. In 1968 the state system of standardization (SSS) as the first in the world practice.
5. USTD — The Uniform System of Technological Documentation belongs to GOST standards.
6. The task of harmonization of Russia's standards and the GOST standards was set in 1980.
7. The recommendable requirements are the ones that deal with safety, conformity of products, ecological friendliness and inter-changeability.
8. During the past years a large number of GOST standards were developed and approved.
9. Nowadays there is a process of their revision so that they conform international standard requirements.

1. Certification systems

I. Read and learn the new words:

to provide – обеспечивать
to evaluate – оценить
conformity – соответствие
law – закон
to appear – появиться
according to – в соответствие с
to perform – выполнить
ability – способность
safety – безопасность
to draw up – составлять
to authorize – разрешать
existence – существование
Attestation – аттестация
Authorization – разрешение
staff – персонал
entrepreneur – предприниматель
entity – организация
evaluation – оценка
to intend – намереваться
variety – разнообразие
to apply – применять
to encounter – сталкиваться
to introduce – представлять
deliverer – поставщик
voluntary – добровольный
obligatory – обязательный
mandatory – обязательно
abroad – за рубежом

II. Read and translate the text:

Creation of certification systems in Russia is provided by the Federal Law №184 “On Technical Regulation” Evaluating the product’s conformity to requirements of laws, standards, technical reglements and other kinds of normative appears to be one of the most important possibilities of providing safety of different kinds of products for humans, environment and the state.

According to the FL № 184 any certification system includes:

- A central certification organ which performs organizational operations within the system;

- Certification organs that must prove their ability to perform activities in expertise and drawing up the certification documents in certain sphere of evaluation of conformity. Only certification organs authorized for such kinds of works, have right to perform such function;

- Certification laboratories perform tests and measurements of safety indicators or quality of the evaluated objects. Such laboratory must have equipment and trained staff (as well as test methods) in order to perform its activities. Existence of all the resources is proved by the Attestation of Authorization of the laboratory in the certain sphere of activity;

- Applicants are individual entrepreneurs or Russian legal entities (in some cases foreign manufacturers), that intend to go though evaluation process to prove the conformity of their production to the legal requirements or some other certain requirements of the system of certification (to which it applied).

There is a great variety of objects for certification (different products and manufacturing processes, management systems, construction sites, etc.). There are the lists of risks that you may encounter by using the products and from which you should protect the consumer. The variety of certification systems in Russia is explained by these two factors as well as by the wish of some corporations to introduce their own requirements for the products deliverers.

There are two big groups of certification systems in Russia: voluntary and obligatory ones. From the names it is clear that the evaluation of conformity for the objects of obligatory certification system appears to be mandatory requirement for all Russian manufacturers and for the products from abroad.

III. Answer the following questions to the text:

1. What is creation of certification systems in Russia provided by?
2. According to the FL № 184 any certification system includes a central certification organ which performs organizational operations within the system, doesn't it?
3. What does Certification laboratories perform?
4. What objects for certification do you know?
5. Are there voluntary and obligatory groups of certification systems in Russia?

IV. Find Russian equivalents to the following international words and combinations:

certification systems, federal, technical regulation, standard, technical reglement, normative, organizational, expertise, resource, legal, manufacturer, corporation

2. Obligatory certification

I. Read and learn the new words:

procedure – процедура
to go through – пройти
unique – уникальный
protection – защита
security – безопасность
according to – в соответствии
marine – морской
civil – гражданский
vessel – судно
craft – ремесло
dish – блюдо
trailer – автоприцеп
nuclear – ядерный
store – магазин
homogeneous – однородный
rubber – резина
asbestos – асбест

II. Read and translate the text:

It is only federal state structure that can create the obligatory certification system of Russia. The system must go through the procedure of state registration. The Rosstandart which is responsible for the certification in Russia as a whole keeps a registry of the RF certification systems. Only after receiving the Certificate of state registration with the unique registration number, you may perform activities in evaluating conformity as a new system.

There are 16 obligatory certification systems in Russia:

1) GOST.

2) Means of protection of information according to requirements of informational security.

3) “Electrocommunication”.

4) Geodesic, cartographic and topographic production.

5) On the federal Railway transport.

6) Means of protection of information.

7) Security of manufacturing of explosives.

8) In the sphere of fire security.

9) Means of protection of information according to requirements of security.

10) Marine civil vessels.

11) On the air transport of the RF.

12) Air techniques and the objects of civil aviation.
13) Space craft.
14) For nuclear sets, the points of storing radioactive materials.
15) Means of protecting the information that include the state secret.
16) Immune biological preparations.

The obligatory GOST certification system consists of sub-systems of certificating homogeneous products. The obligatory GOST R certification system consists of 40 sub-systems according to the kinds of homogeneous production. For example:

- Medical certification;
- The system of certification oil products;
- The system of certification of dishes;
- The system of certification of electrical equipment (SCE);
- The system of certification of mechanic transport means and trailers;
- The system of certification of gases;
- The "SEPROCHIM" certification system (rubber, asbestos) and many others.

The management of state property and organizing certification in the GOST R system in the sphere of technical regulation, is performed by the Rostechregulation (former Gosstandart) which appears to be the Federal agency for technical regulation and metrology (now is called Rosstandart). The given agency is part of the structure of the Ministry of Industry and Trade of the RF.

It became the first and the largest system of evaluation of conformity in Russia and it encompasses all the groups of production that are to be evaluated according to the Federal Law "About protection of Consumers Rights" and it performs the other legislative acts considering separate kinds of goods. The authority of the GOST R obligatory certification systems covers also the voluntary GOST R certification system because the applicants for the voluntary evaluation of conformity apply this very system very often .

III. Answer the following questions to the text:

1. What do you know about the obligatory certification system of Russia?
2. How many obligatory certification systems are there in Russia?
3. What are they?
4. What can you say about the Federal agency for technical regulation and metrology?
5. What does the obligatory GOST R certification system consist of?
6. What was the first and the largest system of evaluation of conformity in Russia?

IV. Find nouns in the following words:

a) federal, b) can, c) create, d) certification
a) must, b) go, c) many, d) agency
a) law, b) largest, c) obligatory, d) first
a) conformity, b) know, c) separate, d) it
a) management, b) evaluated, c) medical, d) homogeneous
a) according, b) apply, c) because, d) rubber
a) equipment, b) performed, c) civil, d) aviation
a) they, b) encompass, c) trailers, d) protecting
a) consumers, b) legislative, c) other, d) often
a) metrology, b) considering, c) dishes, d) called
a) given, b) points, c) geodesic, d) include
a) unique, b) consist, c) immune, d) property

3. Voluntary certification

I. Read and learn the new words:

citizen – гражданин
evaluation – оценка
according to – в соответствии
law – закон
framework – основа, каркас
voluntary certification – добровольная сертификация
to pay – платить
order – заказ
to define – определять
participant – участник
similar – похожий
refusal – отказ
explanation – объяснение
to go through – пройти через
personnel – персонал, кадры
housing – жилье, домостроение
coal production – добыча угля
means – средства
defense – защита, оборона
trading services – торговые услуги
jewelry – ювелирные изделия
advertise - рекламировать

fuel – топливо
fuel services – топливные услуги
retail sale – розничная торговля

II. Read and translate the text:

Any Russian citizen may register such evaluation system according to the law. While creating the system you must set the list of objects to be evaluated on conformity in its frameworks, the indicators and characteristics in accordance to which the voluntary certification will be performed, you must also formulate the rules of system and the pay order of the works in certification, and you must define the participants of the given system of evaluation of conformity.

Registration of voluntary certification system is similar to the procedure of registration of the obligatory system. In the case of refusal, the Rosstandart sends to the applicant explanations of reasons why the new system may not be registered. Nowadays there are more than 130 central certification organs that went through the registration procedure.

Here are the examples of voluntary certification:

- Construction materials "Rosstroisertificazia";
- Personnel and housing services – "Roszhilkommunsertifikazia";
- Means of cryptographic protection of information;
- The production of the Gosstandart of Russia;
- Production and the quality systems defense industries – "Oboronsertifika";
- Certification of food "HAASP";
- Coal production;
- Jewelry (several systems in the given sphere with different names;
- Bio active materials – "BOSTI";
- Services in the sphere of advertising;
- Evaluation of intellectual property objects;
- Information technologies – "SSIT".

Corporative voluntary certification systems:

- Fuel and energy complex (The System "Teksert");
- Equipment for the oil-gas industry "Neftegaz";
- Production and services "Technosert";
- GAZPROMSERT;

Regional national certification systems:

- Trading services in Moscow;
- Trading services "Tulasert";
- Services of gas stations and complexes in Moscow;
- Fuel services in the Moscow Region;
- Services of retail sale in the Sakhalin Region;
- Services of retail sale in the Republic of Sakha (Yakutia);

- Services of gas stations and complexes of the Urals Region "URALSERT-AZS";
- Services of retail sale in St. Petersburg and others.

III. Answer the following questions to the text:

1. What do you need to do for registration of voluntary certification?
2. Are there any differences between the voluntary certification and the obligatory certification?
3. Give examples of the central certification organs.
4. Name the list of corporative voluntary certification systems.
5. What regional national certification systems do you know?

IV. Give English equivalents to the following words and words combinations and make your own sentences with these words:

- система оценки;
- в соответствии с законом;
- добровольная сертификация;
- регистрация;
- в настоящее время;
- процедура регистрации;
- строительные материалы;
- оборонная промышленность;
- оценка интеллектуальной собственности;
- реклама;
- информационные технологии;
- оборудование;
- система корпоративной добровольной сертификации;
- система региональной национальной сертификации

4. The system of GOST

I. Read and learn the new words:

valid – действительный, допустимый
CIS – СНГ
to aim – целиться, стремиться
thus – таким образом
native – родной, собственный
legislation – законодательство
to concern – относительно

to enter – входить, поступать
subject to – подвергать
to match – совпадать, соответствовать
requirement – требование

II. Read and translate the text:

Historically, the GOST system originated from the GOST system developed in the Soviet Union and later adopted by the CIS. Thus, the GOST standards are used across all CIS countries, including Russia while GOST standards are valid only within the territory of the Russian Federation.

This system is aimed at providing the Customer with safety and high quality of products and services. This right of the Customer for safety and quality is guaranteed by obligatory certification of not only native but as well foreign products. Products that enter the territory of the Russian Federation and that is the subject to obligatory certification according to the legislation of the Russian Federation must meet the requirements of **Russian certification system**.

The list of products subject to obligatory certification is defined by Gosstandart and can be seen on www.gost.ru. This system of certification (GOST) has been valid in Russia for many years. The main normative base of it was national standards. At the same time, active policy of Russia towards entering the WTO was the reason for adopting the federal law "On Technical Regulation" № 184-ФЗ. This law was designed to match Russian and European legislation in the sphere of technical regulation.

III. Answer the following questions to the text:

1. What is the aim of the GOST system?
2. The right of the Customer for safety and quality is guaranteed by obligatory certification of not only native but as well foreign products, isn't it?
3. Where can you find the list of products with obligatory certification?
4. What was the reason for adopting the federal law "On Technical Regulation"?
5. Retell the text about the GOST system.

IV. Find the sentences from the text in the Passive Voice and translate them.

THE HISTORY AND THE THEORY OF METROLOGY

I. Read and learn the new words to the text:

to achieve – достигать
uniformity – однородность
accuracy – точность, достоверность
quantity – количество, величина
reference – ссылка, справочный
to transfer – перемещать
linear measures – меры длины
measurements of capacity – измерения объема, мощности
basic provisions – основные положения
dimension – измерение, размер
to treat – обрабатывать, обходиться
to rest on – опираться
high-precision – высокая точность
to obtain – сохранять
to be concern – быть озабоченным
velocity – скорость
density – плотность
equal – равный
value – ценность, значение
arbitrarily – произвольно
sequence – последовательность
scale – масштаб
Brinell hardness – твердость по Бринеллю
random – случайный
interrelationship – взаимосвязь
to involve – вовлекать
to reproduce – воспроизвести
proper – надлежащий, тщательный
calibration – калибровка
facility – средства, сооружение
to charge – назначить цену
to codify – приводить в систему, шифровать
assortment – ассортимент
reference – упоминание
to participate – участвовать

II. Read and translate the text:

1. Metrology as a science

Metrology is the science of measurements and of methods of achieving the required uniformity and accuracy. Among the main problems of metrology are the general theory of measurement, the formation of units and systems of physical quantities, measurement methods and equipment, methods of determining the accuracy of measurements (the theory of measurement errors), the basic provisions for units of measurement and for uniformity of measurement equipment (legislative metrology), the development of standards and reference measurement equipment, and methods for transferring the dimensions of units from the standards to the reference measurement equipment and then to the operating equipment.

Metrology was originally concerned with the description of the various types of measures (linear measures; measurements of capacity, mass, and time), and also of the coins used in various countries and the interrelationships among them.

The development of metrology reached a turning point in 1875, with the conclusion of the Metric Treaty and the founding of the International Bureau of Weights and Measures. Modern metrology rests on high-precision physical experimentation, and it uses the achievements of physics, chemistry, and other natural sciences, but it also establishes its own specific laws and rules that make it possible to find a quantitative expression for the properties of objects in the material world.

A general theory of measurements has not yet taken shape; such a theory includes information and generalizations that are obtained as a result of analysis and study of measurements and their elements: physical quantities and their units, measurement equipment and methods, and the results of measurement.

In metrology, as in physics, a physical quantity is treated as a property of physical objects (systems) that is qualitatively common to many objects but is quantitatively different for each object - that is, as a property that can be a certain number of times larger or smaller for one object than for another (for example, length, mass, density, temperature, power, or velocity). Every object has a definite length, mass, and so on; the concept of quantity thus becomes concrete for the object (the length of a table, the mass, the weight, and so on).

Only concrete quantities may be measured. For the objective evaluation of a quantity, a unit must be selected (for some quantities). A unit is a specific physical quantity whose numerical value is arbitrarily taken as equal to 1). The sequence of values of different size adopted by agreement for like quantities is called the scale of a quantity (for example, a temperature scale or the Brinell hardness scale).

With the development of science, units have changed from a random choice of individual quantities to the construction of systems of units. The theoretical aspects of the interrelationships among the physical quantities and the principles involved in constructing a system of units, as well as specific systems of units, are examined in metrology.

Proper calibration and periodic testing of all the measuring facilities in use are necessary to achieve uniformity of measurements (that is, to obtain results expressed in codified units that are not dependent on the time, place, and measurement equipment). To this end, standards of units and an assortment of reference measurement equipment are needed. Metrology studies methods of reproducing units by means of standards, ways of improving accuracy, and procedures for transferring the dimensions of the units (methods of testing).

A large section of metrology is devoted to methods of determining measurement errors by using the theories of probability and mathematical statistics, and sometimes of other branches of mathematics.

III. Answer the following questions to the text:

1) What does the science of metrology study?
2) What are the main problems of metrology? Name some of them.
3) What is treated in metrology as a property of physical objects (systems)?
4) What was the historic point of the development of metrology?
5) Modern metrology rests on high-precision physical experimentation, doesn't it?
6) What is the first step in the objective evaluation of a quantity?
7) Do you know numerical value of a physical quantity unit?
8) What scales of a quantity do you know?
9) Metrology studies methods of reproducing units by means of standards, ways of improving accuracy, and procedures for transferring the dimensions of the units (methods of testing), doesn't it?
10) What is metrology devoted to?

2. Legislative metrology

Legislative metrology treats questions associated with the achievement of uniformity of measurements and uniformity of measurement equipment that must be regulated and monitored by the government. Countries organize metrological services to take the required steps. In the USSR the State Metrological Service is under the control of the State Committee on Standards of the Council of Ministers of the USSR. Because of the increasing role of metrology in the development of science, technology, and industry, special scientific research institutes of metrology were founded in a number of countries as early as the turn of the 20th century. Among them were the Main Bureau of

Weights and Measures in Russia (1893; now the D. I. Mendeleev All Union Scientific Research Institute of Metrology), the State Physicotechnical Institute in Germany (1887), the National Physical Laboratory in Great Britain (1899),and the National Bureau of Standards in the USA (1901). In the 20th century a number of international metrological organizations were founded and charged with the development and adoption of common recommendations and resolutions for all the participating countries on the metrological questions under consideration.

Metrological journals include Izmeritelnaia tekhnika (Measurement Technology; 1940-41 and since 1955), which was precededby Poverochnoe delo (Testing; 1916–29), Izmeritelnaia tekhnika i poverochnoe delo (Measurement Technology and Testing;1930–38), Metrologija i poverochnoe delo (Metrology and Testing; 1938–39); Metrologia (Berlin, since 1965); Bulletin del'Organisation Internationale de Metrologie Legale (Paris, since 1960); Journal of Research of the National Bureau of Standards(Washington, since 1928); Wissenschaftliche Abhandlungen der Physikalisch-technischen Bundesanstalt (Braunschweig, since1949).

I. Answer the following questions:

1) Define the term and the problems of legislative metrology.
2) What scientific research institutes of metrology do you know?
3) When were they founded?
4) Give examples of the metrological journals of the past years.
5) Give examples of the modern metrological journals.

3. Metrology information of Rostest

I. Read and learn the new words to the text:

measurement – измерения
to assure – заверить
accuracy – точность, правильность
uniformity – равномерность, единство
confidence – доверие, степень достоверности
assurance – гарантия
means – средства
body – орган
value – ценность, значение, стоимость
quantity – количество , величина
probability – вероятность
in order to – в целях
to accredit – аккредитовать

foodstuff – продовольствие
trade – торговля
to collate – обобщать
usage – применение
calibration – поверка, калибровка
consumption – расход, потребление
to deal with – иметь дело с
labour safety – охрана труда
decisive – решающий, убедительный
comparison – сравнение
domestic – внутренний, отечественный
liquid – жидкий, сжиженный
draining systems – дренажные системы
step – шаг, этап
billions – миллиарды
hydrometeorology – гидрометеорология
similarly – аналогично, подобно
verification – проверка
repair – ремонт
harmful – вредный, опасный
to check – проверить
utilization – использование, утилизация
consumer's rights – права потребителя
consolidation – обобщение, объединение
conception – концепция, понятие
determination – определение
purpose – цель

II. Read and translate the text:

Measurements and measures to assure their uniformity and accuracy are united under one conception "Metrological assurance " which is traditionally defined as activity for establishing and using scientific and organizational bases of technical means, rules and norms for achievement of uniformity and required accuracy of different ways to define values of physical quantities.

Uniformity of measurements as one of components of Metrological Assurance is such a state of measurements at which the results are expressed in legalized units and errors of measurements are known with certain probability. Uniformity of measurements is necessary in order to collate the results of measurements made in different places at different time with usage of various methods and means of measurements.

Rostest-Moscow is a territorial body of State metrological service (BSMS) Rostest-Moscow has been accredited as State Center of tests (SCMM)

The laboratories of BSMS are dealing with calibration and tests of means of measurements (MM), certification of testing equipment (TE).

Medicine, environment protection and assurance of labour safety, scientific research and production, transport and communication, geodesy and hydrometeorology, trade and finance. There is no type of activity where measurements would not have a decisive meaning. Their accuracy and comparison are assured by metrologists. Similarly as we check our watch against signals of the exact time, billions of means of measurements check their step against measurement standards.

Technical and stuff potential of Rostest-Moscow makes it possible to perform metrological assurance practically of all types of means of measurement of domestic as well as import products used for:

1) manufacture and tests of industrial products and foodstuffs;

2) determination of harmful factor parameters (vibration, noise etc.);

3) diagnostics and non-distruction control, determination of thermo-physical characteristics of construction materials and building elements;

4) calculation of water resources in the systems of cold and hot water supply and draining systems, heat energy and quantity of heat bearer in water and steam systems of heat supply of open and closed type, liquid and gaseous oil products in the process of transportation, storage and selling;

5) calculation of consumption of electricity and gas.

Purposes and tasks of metrological assurance and uniformity of measurements are determined by legislative and normative documents and by necessity of further consolidation of position of BSMS “Rostest-Moscow” in the field of:

1) uniformity and confidence of measurements;

2) calibration and tests of means of measurements in the Health Service;

3) protection of consumer’s rights;

4) safety of goods and services;

5) environment protection;

6) labour safety;

7) calculation and consumption control of energy resources (realization of the Federal Law “About energy saving”);

8) metrological assurance of tests and product quality. Main directions of activity of Rostest (State Metrological Service)

9) maintenance and storage of reference standards;

10) forecasts, conceptions, programs

11) tests of means of measurements, metrological certification of standard samples

12) verification of MM from utilization

13) verification of MM from new production

14) repair of MM with subsequent verification

15) tests of MM for pattern approval

16) mandatory certification of MM on compliance to safety requirements

17) accreditation of metrological services of legal persons to have the right of verification and calibration and inspection control

18) metrological certification of testing equipment

19) training and upgrading of the specialists.

III. Answer the following questions:

1. What does the conception “Metrological assurance” mean?
2. Uniformity of measurements is such a state of measurements at which the results are expressed in legalized units and errors of measurements are known with certain probability, isn't it?
3. What does Rostest-Moscow deal with?
4. What means of measurement of domestic and import products do you know?
5. What are purposes and tasks of metrological assurance determined by?
6. What fields of the State metrological service (BSMS) do you know?
7. Express your opinion concerning the the most important fields of the BSMS?

IV. Match the right variant.

probability	определение
usage	средства
calibration	права потребителя
consumption	доверие
confidence	расход
assurance	концепция
means	применение
foodstuff	дренажные системы
trade	сжиженный
to collate	поверка
consumer’s rights	права потребителя
consolidation	отечественный
conception	гарантия
determination	вероятность
domestic	обобщать
liquid	торговля
draining systems	продовольствие

PART II. MAIN AND SECONDARY BUILDING MATERIALS

1. The history of building materials in the USA

I. Read and learn the new words to the text:

bark – кора, кожа
thatch – солома, тростник
wattle – плетеный, акация
nomadic tribes – кочевые племена
gable – фронтон
vaulted – сводчатый
trunk – ствол
rectangular – прямоугольный
sandstone – песчаник
outcropping – выход
mortise-and-tenon – соединение в шип (в гребень) шиповое соединение
wooden peg – деревянный колышек, гвоздь
lime mortar – известковый строительный раствор
masonry – каменная кладка
kiln-baked – обжигом в печи
adobe brick – необожженный кирпич
post – подпорка, свая, стойка
girder – балка
rafter – стропило
joist – брус, балка
brace – скоба
truss bridge – ферма моста

II. Read and translate the text:

The Indian people of North America had developed mature building techniques suitable to Neolithic cultures long before Europeans established their first settlements on the continent. In the eastern area of America, forests covered most of the land, and building accordingly consisted of gabled, domed, or vaulted frames built up of branches or light trunks and covered with bark, thatch, or wattle. On the prairies the collapsible tent of nomadic tribes was constructed of a conical framework of saplings covered with skins. Permanent structures in the northern areas were circular, framed in substantial timbers, and covered with a thick layer of mud and grass for insulation against the cold and for protection against snow and wind. In the Sierras, where snow was the chief problem, steeply pitched frames of trunks and branches were covered with heavy slabs of wood rudely shaped from trunks split by wind. Variations on

these structures, built with larger openings and covered with thatch, appeared in the warmer coastal areas.

In the deserts of the Southwest, where wood was scarce and heat insulation a necessity, the large communal structures known as pueblos were constructed in tiered series of rectangular apartments. They had thick walls of adobe (sun-dried brick) and roofs composed of branches laid on transverse log beams and covered in turn with a heavy blanket of clay. In the canyons of what is now northern New Mexico and southern Colorado, clays suitable for brick were scarce, but there were extensive outcroppings of sandstone that could be easily broken off into building stones. The Indians who penetrated the canyons constructed their pueblos of thin sandstone tablets laid either on the alluvial floor or on shelves and notches eroded in the canyon walls.

The Europeans who established the North American colonies in the seventeenth century brought their knowledge of materials and techniques from their native lands, but during the first few years of settlement they were often compelled to adopt Indian techniques. The English, Dutch, German, and French who settled the seaboard and Gulf coast areas brought variations on framing in sawn timbers. Frames were usually covered with clapboard siding for walls and shingles for roofs - the latter gradually giving way to slate and tile in the more elegant houses, especially those built by the Dutch. Construction in thick wooden planks set vertically came to be common in parts of the Connecticut Valley, while construction of solid walls built up of horizontally laid logs was introduced by Swedish settlers in the Delaware Valley. The only stone in these early structures was confined to foundations and chimneys. Joints were originally the mortise-and-tenon form secured by wooden pegs, but hand wrought nails began to be used early in the seventeenth century and machine-made varieties in the late eighteenth century.

In the more costly forms of buildings, brick laid up in lime mortar slowly replaced timber construction in the English-speaking areas, but expensive stone masonry was confined largely to the Dutch settlements of the New York area. The domed and vaulted construction of eighteenth-century mission churches required kiln-baked, stucco-covered brick, which was stronger and more manageable than the adobe brick, widely used in the Spanish Southwest. All of the traditional European building materials were used throughout the nineteenth century, although with some innovation. Heavy power-sawed timbers were used as posts, sills, girders, rafters, joists, and braces in buildings and truss bridges; deep laminated timbers of bolted planks were developed early in the nineteenth century for the arch ribs of bridges; thinner lumber, like the two-by-four, which was soon to become universal, became the basis of the light balloon frame invented in 1833. As the nation expanded, carefully dressed masonry work of both stone and brick began to appear in large and elegant forms.

III. Answer the following questions to the text:

1) Who had developed mature building techniques suitable to Neolithic cultures long before Europeans established their first settlements on the continent.

2) In what way were the buildings in the eastern America constructed?

3) Were permanent structures in the northern areas circular or square?

4) What kind of dwellings were in the deserts of the Southwest of America?

5) Describe these apartments.

6) What material did the Indians use for the construction?

7) Did the Europeans brought their knowledge of materials and techniques from the foreign lands or their native lands?

8) What frames did the Dutch use in their houses?

9) Did they use stones and for what purposes?

10) Did lime mortar replace timber construction in the English-speaking areas in the late eighteenth century?

11) What innovation did take place in the nineteenth century?

12) When was the light balloon frame invented?

IV. Match the right variant.

lime mortar	песчаник
masonry	ферма моста
adobe brick	ствол
post	брус
girder	стропило
rafter	балка
joist	свая
brace	прямоугольный
truss bridge	каменная кладка
gable	фронтон
vaulted	сводчатый
trunk	необожженный кирпич
rectangular	скоба
sandstone	известковый раствор

2. Stone: its durability, selection and preservation

I. Read and learn the new words to the text:

suitable – подходящий
supreme – главный, верховный
label – метка, ярлык
locality – местность
specimen – образец
quarry – карьер
tint – оттенок, тон
generic – общий, универсальный, типовой
brief – краткий, короткий
to be unsuited – быть неприспособленным
to utilize – использовать
inspection – проверка, осмотр
infinitely – бесконечно, безмерно
shade – тень, оттенок
innumerable – бесчисленный
sample – образец, проба
bed – дно, русло
strict – жесткий
uniformity – однородность, единобразие
ascertain – точно установить
in advance – заранее
to bring out – вывести
to be obtainable – быть доступным
ornamental markings – декоративные маркировки
fossiliferous – содержащий окаменелости
vein – жила, вена
grain – гранула, зернистость
marble – мрамор
texture – текстура, фактура
homogeneity – однородность
to chisel – бурить, долбить
solidity – прочность, твердость
stairs – лестница, ступеньки
landings – перекрытия
pavements – тротуары
smooth surface – гладкая поверхность
limestone – известняк
lias limestone – гидравлическая известь лиассовой формации
slippery – скользкий, гладкий

labour – труд
plain – простой, ровный
wear – износ
angular – угловой , граненый
grit – песок, гравий, зернистость
to prevent – предотвратить
coarse sandstones – крупно-зернистые песчаники
bedding – наслоение, залегание
slab – плита, панель
ordinary circumstances – обычные обстоятельства
to be capable – быть способным
slight – легкий, незначительный
load – груз, нагрузка
to undercut – подрезать
moulding – формовка, отливка
to flake off – отслаиваться
joint – разрыв горных пород, (соединение)
inquiry – запрос
durability – срок эксплуатации, долговечность
to penetrate – проникать внутрь
to blow off – продувать
renewal – обновление, восстановление
advantage – преимущество
extent – степень, объем

II. Read and translate the text using the new words:

The selection of the most suitable stone is a matter of supreme importance. That the information needed may always be at hand when required, it is well to keep a cabinet of labelled specimens, each label containing not only the generic name of the stone, but a brief record of its principal characteristics, the name and address of the quarry owner, the locality of the quarry, facilities for transport, and the price of the stone on rail or ship. There is scarcely a stone produced that is not frequently specified to be used in a position for which it is entirely unsuited, while the same stone might in another position, and for another purpose, be the best which could be utilised.

Colour is a point upon which actual inspection is infinitely more valuable than description, as in all colours the various shades are innumerable. Even samples often fail here, however, for many stones vary in tint not only between different beds of the same quarry, but even in different parts of the same block. Thus, if strict uniformity is required it should be ascertained in advance whether it be obtainable.

Ornamental markings, as in the veined and the fossiliferous stones, stand in this respect upon the same footing as colour; and in the case of some of the English marbles even the quarrymen do not know till it is cut what will be the colour or the marking of the next block they bring out.

Texture depends not only on the size of the grains of which a stone is built up, but on their character and the homogeneity of the mass, and is frequently of considerable importance. Most of the very hard stones, like the granites, marbles, and compact limestones, can be brought to a smooth surface, and in that condition be left plain or be highly polished, the latter being the more usual and displaying to perfection their marking and colouring. Granite, however, may be left with a roughly chiselled or even a hammer dressed surface, when its coarse and angular grain gives an effect of great solidity and strength.

Hardness is one of the qualities in a stone which most considerably affects its cost in use; for it is generally not so much the raw material which varies in price, as the value of the labour which has to be spent in working it. Thus where economy is a principal object for consideration, the softest stone which will serve the purpose should be used.

Wear demands something more than mere hardness to withstand it successfully. When used as stairs, landings, or pavements, many of the more compact stones become slippery, while others, like the lias limestones, wear into holes. An angular grit prevents slipperiness, and this is possessed as a rule by granite and the coarser sandstones. Those sandstones which occur naturally in slabs in thickness with true surfaces, are much used for these purposes.

Strength in stone is not often a matter requiring great consideration, as under ordinary circumstances any stone is capable of bearing the slight load brought upon it; but where, as in vault groining, church pillars, columns, and girder bearings, great thrusts and loads are brought to bear upon small surfaces, strength becomes of supreme importance.

Correct bedding is, in the case of most of the laminated stones an absolute necessity. In ordinary walling, bearing a vertical load only, the beds should lie horizontally. Were horizontal bedding attempted, however, with undercut mouldings, the undercut portion would flake off, as shown by dark lines in the illustration, and so edge moulding is resorted to, with the bedding parallel to the vertical joints.

The size of slab and depth of bed obtainable are important factors in determining the selection of stones for many purposes, where large sizes are needed. Many otherwise excellent stones are obtainable only in comparatively thin beds. As a rule special inquiry upon this point is necessary, else much trouble and delay may result.

The durability of a stone used externally seems to be a matter which can properly be determined by experience only. Where subject to the action of water and of marine insects, as in sea walls, weight and hardness are essential to durability, but in general building work this is not the case, many stones of

comparatively light weight and open structure being known to be excellent weathering stones. Water may penetrate into the pores of some stones, freeze, expand, and blow off fragments; but this is an infrequent occurrence, except with the very softest, which few would think of using.

Even absorption is not an entirely reliable test of durability, and certainly not as between class and class of stone. Walls built of absorbent stones are, it must be remembered, liable to be damp walls, especially if the stones be compact of structure as well as absorbent, and so of a nature which prevents their parting readily in fine weather with the water they have absorbed during rain.

Several means of preserving the less durable stones have from time to time been suggested, painting either with lead paint or with oil being the most common, and requiring periodic renewal. It is better to use a durable stone in the first instance than to trust to these or any other preservative. They have, however, the advantage over other preparations of being colourless and not affecting the appearance of the stone to a material extent.

V. Answer the following questions to the text:

1. What can you say about the selection of the most suitable stone?
2. Do you think the colour of the stone is more valuable than description?
3. What does the texture of the stone depend on?
4. What does give granite an effect of great solidity and strength?
5. What quality in a stone does most considerably affect its cost in use?
6. When do compact stones become slippery?
7. Where does strength in stone become of supreme importance?
8. What can you say about the durability of a stone?
9. What are the qualities of walls built of absorbent stones?

VI. Continue the following sentences:

1) The selection of the most suitable stone is …
2) Ornamental markings stand in this respect …
3) Texture depends not only on the size of the grains …
4) Granite may be left with a roughly chiselled …
5) An angular grit prevents slipperiness …
6) The size of slab and depth of bed obtainable are …
7) Walls built of absorbent stones are liable …
8) Correct bedding is …
9) In ordinary walling, bearing a vertical load only …
10) Water may penetrate into the pores …

3. Limestone

I. Read and learn the new words to the text:

limestone – известняк
consequently – следовательно
to occur – случаться, происходить
to distinguish – различать
custom – изготовленный на заказ
mineral contents – содержание минеральных веществ
fissile – расслаивающийся
pisolitic – пизолитовый (об осадочной породе)
oolitic – оолитовый
concretionary – конкреционный, стремящийся к срастанию
shelly – похожий на раковину
argillaceous – содержащий глину, глинистый
siliceous – содержащий кремний, кремнистый
bituminous – битумный
dolomitic – доломитовый
variety – разнообразие
brecciate – брекчироваться
coralline – коралловый
whilst – в то время как
sedimentary strata – осадочные породы, слои
sandstone – песчаник
levering – поднимание рычагом
wedging – расщеплении, раскалывание
lamination – расслоение, натекание
sufficiently – достаточно
chipping – скалывание, стружка
bitumen – битум
pitch – природный асфальт, (наклон)
obscure – неясный, неотчетливый
unsaturated – ненасыщенный
gravity – тяготение, безнапорный, падающий
soluble – растворяемый
oil of turpentine – скипидарное масло
damp-coursing – гидроизоляция
sewer – канализация, стоки
culvert – водопропускная труба
grit – песок, гравий, зернистость
rigid – жесткий, твердый
billiard cues – бильярдные кии
impervious – непроницаемый, непроходимый

laminated lead – листовой свинец
proof – герметизировать, проверка, проба
to impregnate – вводить
mining – добыча
streak – полоса, прослойка, промежуток
faint – слабый
stain – краситель, протрава
marl – глинистый известняк
rubble – булыжник

II. Read and translate the text using the new words:

It consequently happens that in any classification of limestones, the same name will sometimes occur in two different lists. There are so many varieties of limestone that they have to be distinguished in some way. Custom has based a nomenclature for them, rather irregularly, on their physical condition, mineral contents, and stratigraphical relation to other rocks, and sometimes on the three combined. Limestone can be crystalline or amorphous, compact or fissile; it may be pisolitic, oolitic, concretionary, or shelly; there are argillaceous, siliceous, bituminous, and dolomitic varieties; others may be brecciate or coralline, whilst there is no end to the names they derive from their relation to other rocks in the sedimentary strata.

Sandstones are all worked in open quarries, either by levering and wedging, where the lamination is thin and the beds distinct, or by blasting when the stone occurs in rock masses, the processes generally being very similar to those already described, and the thinner slabs of softer stone as a rule overlying the thicker blocks of compacted rock. After quarrying, the stone is not only shaped to rough block, but is often completely worked up ready for fixing in position at the quarry side, where there are the proper machinery and workmen skilled in the manipulation of the particular stone produced, most of the sandstones being sufficiently hard to stand a railway journey after being worked without serious risk of being chipped in transit. There is not much waste, as the chippings can be used as road metal, or crushed for concrete.

Bitumen, or natural pitch, though limited for its commercial supply to a few districts, is nevertheless by no means of local or limited occurrence. Its origin is somewhat obscure, but it is probably the result of oxidation of the unsaturated hydrocarbons in petroleum. Its specific gravity is I '0924 and it is partially soluble in alcohol and more completely soluble in carbon bi-sulphide, petroleum spirit, chloroform, oil of turpentine, coal-tar, benzol and naphtha. Much of it is used for laying pavements, for damp-coursing, cellar or basement flooring, flat-roofing, bridge-building, and to stop vibration in engine foundations, culverts, tunnels and subways.

Electricians find it the best and most effective insulator known. It is elastic, and is used in various circumstances where rigid cements fail, and wherever allowance has to be made for expansion and contraction. It is also employed in the manufacture of marine glue, and in its most highly refined state is made into wafers for fastening the tips on billiard cues. All the well-known asphalt firms employ bitumen for purposes for which their own rock asphalt is not so well suited, sometimes alone and sometimes mixed with asphalt rock or grit.

Of late years bituminous sheets have been made, by running refined bitumen on to paper bagging, which are capable of being bent in any direction without cracking and yet can be perfectly joined and are impervious to moisture. This material is now very largely used as a damp-course, and also for lining ponds and tanks, for covering arches, and between the inner and outer rings of brick sewers. It is made in various thicknesses. A modification of this, consists of two layers of bitumen sandwiching a thin sheet of "laminated lead" between them. It is acid proof, and can be cut with a knife and bent in any direction; and is made in 6 ft. lengths and all standard breadths.

Rock asphalt, used for carriage-ways in Europe, is a natural limestone impregnated with natural bitumen. The rock when quarried is of a chocolate colour, fine in grain, thoroughly and evenly impregnated with bitumen, varying from 6% of bitumen and 94% of pure limestone to 14% of bitumen and 86% of limestone. The following information explains the matter very fully: the method of obtaining this bituminous limestone or rock asphalt is by mining, and the seams are of varying thicknesses from very narrow streaks to 6 ft. and 10 ft. deep. It is found between two layers of white hard limestone either totally impregnated with bitumen or else with mere traces of it, which have the appearance of thin smoke or the faint stains in white marble. Sometimes, however, layers of sand and marl are found which have to be propped or held up by rubble.

III. Answer the following questions to the text:

1) What is the classification of limestones?
2) Do the limestones derive from their relation to other rocks in the sedimentary strata?
3) Where are sandstones worked?
4) What process does take place after quarrying?
5) How is bitumen called in the other way?
6) What is its specific gravity?
7) What is bitumen used for?
8) Electricians find bitumen the best and most effective insulator known, don't they?
9) What purposes do the asphalt firms employ bitumen for?
10) What can you say about bituminous sheets?

11) Where are they used?
12) What is rock asphalt and where is it used in Europe?
13) What colour does the rock asphalt have?
14) What is the method of obtaining the bituminous limestone or rock asphalt?

IV. Match the right variant.

limestone	битумный
consequently	различать
to occure	похожий на раковину
to distinguish	происходить
custom	разнообразие
mineral contents	содержание минеральных веществ
oolitic	булыжник
concretionary	содержащий кремний
shelly	следовательно
argillaceous	глинистый
siliceous	стремящийся к срастанию
bituminous	известняк
dolomitic	доломитовый
variety	изготовленный на заказ
rubble	оолитовый

4. Cement

I. Read and learn the new words to the text:
efficacious – эффективный, действенный
fire-resisting – огнеупорный
glaze – глазирование
repair – ремонт
fire-clay – огнеупорная глина
moderate – умерить, смягчить
admixture – добавка, примесь
fluxes – плавень
lime – известь
grate – решетка
encounter – столкновение
to reduce – сокращать
batter – величина уклона

II. Read and translate the text using the new words:

The white and dark cements are equally efficacious as fire-resisting materials. The white is generally used for glazing and for other purposes where the colour of the work or surroundings have to be matched. The dark is generally used for general repairs, it being lighter in weight. The cement is sent out ready for use, and may be used for most purposes for which fire-clay is employed. It should, as a rule, be applied in the same manner in the consistency of newly tempered mortar. If too stiff, add a little clean water; for resisting great heat, add powder well mixed together. The cement is not intended to be brought in contact with lime, chemicals, fluxes, etc.

The powder is not cement in a dry state, which can be converted into plastic cement by wetting it; it is an entirely different composition, and is not to be used by itself. It is prepared for combining with cement in cases of great heat; to impart to it greater body; or to cause it to set more quickly when cold. For moderate heats i.e., not exceeding 1 200 Fahr. (as in open fire-grates, or in pointing round kitchen ranges, etc.) the cement should be used by itself. For very high temperatures the best results will be obtained by the admixture of a sufficient quantity of powder (failing it, sifted fire-clay); and, as a rule, the greater the intensity of heat to be encountered, the greater should be the proportion of powder (say 1 to 3 parts or more of powder to 1 of cement).

The best method of perfectly and readily mixing together the cement and powder is this: In a clean bucket, reduce the required quantity of cement to a batter or wash, to which add gradually the proper proportion of powder.

III. Answer the following questions to the text:

1) Are the white and dark cements fire-resisting materials?
2) What is the white cement generally used for?
3) What is the dark cement generally used for?
4) Can powder be a cement in a dry state?
5) Say a few words about the method of cement making**.**

IV. Find the sentences with modal verbs and Passive Voice from the text.

5. Lime and its products

I. Read and learn the new words to the text:

quicklime – негашеная известь
impure – неочищенный, с примесью
chalk – мел
substance – вещество
moisture – влажность
calcining – обжиг
to escape – избегать
to accomplish – осуществлять, завершить
intermittent – нерегулярный. неустойчивый
flare – вспышка, блик
kiln – печь, обжиг
furnace – домна, печка
flame – пламя
piled up – нагроможденный
whence – откуда
cone – конус
barrow – тачка
shed – навес
affinity – сродство
caustic – едкая щелочь
disinfectant – дезинфицирующее средство
sprinkled – забрызганный
lump – кусок, глыба
cesspool – сточная яма
midden – мусорная яма
to tumble – вываливать
slaked lime – гашеная известь
distemper – клеевая краска
contemporaneously – одновременно
coagulating – коагулирование, свертывание
cumulative – суммарный, совокупный
lias – лейас, сорт известняка
whitewash – побелка
coat – покрытие, слой

II. Read and translate the text using the new words:

Lime, or quicklime, is a more or less impure oxide of calcium obtained by heating limestone, chalk, shells, coral, or any other substance composed almost

entirely of calcium carbonate in such a position, generally in the open air, that the carbonic acid gas and any moisture which it contains are given off and escape. This operation is known as burning or calcining.

The process of calcining is accomplished in kilns, of which there are two principal varieties. Pure chalk lime whose colour it is important to preserve is burnt in intermittent flare kilns in such a way that only the flame from the furnace reaches the stone, which is piled up above the fuel over rough limestone arches; but much more frequently tall, inverted, cone-shaped draw kilns are used, the fuel (coal) and stone being piled up in them in alternate layers and worked to a roughly formed cone on top. Such a kiln is generally built on a hillside, so that it can be filled from the top (which is quite open) and emptied from the draw-hole at the bottom when burnt through, the average time taken in burning being about a week. When the fire has burnt out and the lime is cool enough for handling, the furnace bars are removed and the contents of the kiln fall down to the draw-hole, whence they are at once carried in barrows into a shed to be either sold in lump or ground to powder.

Pure quicklime has a great affinity for water, and is extremely caustic, rapidly burning up and entirely destroying any organic matter with which it may come in contact. It is consequently much used as a disinfectant, being freely sprinkled over or dug into the contents of old cesspools or midden pits if such are met with in building operations. If water is added to quicklime it “slakes” that is, it absorbs the water with effervescence, giving out heat, and, if in lump form, tumbles to a fine powder. The caustic properties have been lost and the substance converted into hydrate of lime, generally known as “slaked lime”. Pure slaked lime, known as Rich Lime, has very little strength, and is mostly useful for whitewash and as a base for distemper.

Other impurities, however, notably clay and to a lesser extent magnesia and oxide of iron, affect lime most advantageously by their presence. They reduce the slaking action, rendering it slower at the same time; the extent to which the impurities are present being well indicated in this way. They also, according to the extent to which they are present, confer upon the lime the property of setting that is, of contemporaneously hardening and coagulating, cementing together substances with which it is in proximity. This action, especially in the less pure varieties, seems to be cumulative, increasing slowly for a very long and at present undetermined period of time, and in such cases is better displayed under water than in air.

Whitewash is a mixture of white quicklime and water. Any lime can be used so far as its efficacy is concerned, but where, as in the case of lias, the lime is slightly tinted, the whiter lumps are picked out for conversion into whitewash. The lime should be mixed up while “hot” with plenty of water, and applied at once with a large brush to the surface to be coated. The process, known as limewhiting, is exceedingly inexpensive, and is almost universally employed where, for sanitary reasons, frequent reapplication is desirable. Whitewash is by

no means durable, as it rubs off easily, is washed away by rain, and does not adhere well to smooth surfaces. Constant renewal is therefore necessary, and it should not be used at all in exposed situations in its pure state. A moderately permanent whitewash for external use can, however, be made by thoroughly slaking lime in boiling water and adding sulphate of zinc and common salt.

III. Answer the following questions to the text:

1) What is the content of quicklime?
2) What process is known as calcining?
3) Where does this process take place?
4) Where are the kilns for calcining generally built?
5) What is consequently used as a disinfectant?
6) If water is added to quicklime it “slakes”, isn't it?
7) What substances reduce the slaking action?
8) Say a few words about whitewash.
9) Is the process of limewhiting expensive?
10) How can slaking lime be made for external use?

IV. Find the sentences with these words and word combinations in the text and translate them into Russian.

1) burning – горение, обжиг
2) cone-shaped – конусовидный
3) quicklime – негашеная известь
4) hardening – укрепление, закаливание
5) coagulating – свертывание
6) mixture – смесь
7) external use – внешнее, наружное применение
8) constant renewal – постоянное обновление, восстановление
9) smooth surface – гладкая поверхность
10) permanent – постоянный, неизменный

6. Concrete

I. Read and learn the new words to the text:

constituent – составная часть
to employ – нанимать, пользоваться
foundation – основа, фундамент
excessive – избыточный, чрезмерный
lintol - перемычка

framework – каркас, рама
fire-resisting – огнеупорный
dome – купол
lias lime – лейасский известняк
bushel – бушель
tub – кадка, бочонок
to pour – налить
window sill – подоконник
to penetrate – проникать внутрь
watering-can – лейка
hose – шланг, трубка
shingle – галька, черепица
slag – шлаг, окалина
to saturate – насыщать
gauging – замер
floor – этаж
mould – форма
lintol – перемычка
to slake – гасить известь
artificial stone – искусственный камень
to advertise - рекламировать
to prevent from – предотвратить от
to deposit – давать осадок, осаждать
high-sounding – громкий, высокопарный
slight – незначительный
pressure – давление
to delay – задерживать
aggregate – заполнитель

II. Read and translate the text using the new words:

Concrete is such a material, according to its constituents and the proportions in which they have been employed, is useful for foundations, walling, damp-resisting floors, lintols, and as a filling between steel framework in fire-resisting floors, and in flat and domed roofs. For ordinary foundations, where there is no excessive weight to carry, lime concrete may be used, and a suitable mixture is as follows: 1 part of ground stone or lias lime, 1 part clean sharp sand, and 4 to 5 parts broken stone, bricks, or well burnt ballast, small shingle, or slag.

The ingredients should be very thoroughly mixed dry, and again when water is added, which should be through the rose of a watering-can or hose, in just sufficient quantity to penetrate but not to saturate the mass. Concrete may be made with selenitic mortar as a matrix, by using 6 full-sized pails of water, 3 bushels of selenitic lime, and 3 bushels of clean sand. These ingredients should

be mixed as before in the edge runner or tub, and then incorporated with from 15 to 18 bushels of broken stone or bricks or burnt ballast, the whole being turned over 2 or 3 times on the gauging floor to ensure thorough mixing with the ballast. When the tub is used the sand must be first mixed dry with the ballast, and the lime poured into it from the tub, and thoroughly mixed on the gauging floor.

Concrete can also be cast in moulds for many purposes, such as window sills and lintols, being then made with small aggregate and often kept under slight pressure until setting is complete. Many artificial stones, largely advertised and sold under high-sounding names, are nothing else than cement concretes. Cement concrete should be used at once, but lime concrete may be left for a short time before being used to ensure the slaking of all the lime. It is desirable that concrete for foundations should not be built upon until it has been allowed to set for at least seven days. Where more concrete is to be deposited on any concrete face that has become dry, such surface should be thoroughly cleaned and well wetted previous to the application of the new material. One of the great practical difficulties which is met with upon public works is getting concreters to mix materials in small quantities just sufficient for immediate use. If large volumes are mixed at one time they can only be prevented from setting by the addition of excessive quantities of water, and this will have a most harmful effect upon the work for all time, as proper crystallization will never take place. If small quantities are used and mixed with just enough water to make them plastic and workable, a first-class concrete is obtained. It should be remembered that chemical action begins with a cement as soon as water is added, and this action is not delayed by the addition of sand or other aggregate. It follows, therefore, that cement concrete which has partially set should be thrown upon one side.

Concrete can also be cast in moulds for many purposes, such as window sills and lintols, being then made with small aggregate and often kept under slight pressure until setting is complete. Many artificial stones, largely advertised and sold under high-sounding names, are nothing else than cement concretes. Cement concrete should be used at once, but lime concrete may be left for a short time before being used to ensure the slaking of all the lime. It is desirable that concrete for foundations should not be built upon until it has been allowed to set for at least seven days. Where more concrete is to be deposited on any concrete face that has become dry, such surface should be thoroughly cleaned and well wetted previous to the application of the new material. One of the great practical difficulties which is met with upon public works is getting concreters to mix materials in small quantities just sufficient for immediate use. If large volumes are mixed at one time they can only be prevented from setting by the addition of excessive quantities of water, and this will have a most harmful effect upon the work for all time, as proper crystallization will never take place. If small quantities are used and mixed with just enough water to make them

plastic and workable, a first-class concrete is obtained. It should be remembered that chemical action begins with a cement as soon as water is added, and this action is not delayed by the addition of sand or other aggregate. It follows, therefore, that cement concrete which has partially set should be thrown upon one side.

III. Answer the following questions to the text:

1) What kind of material is concrete?
2) What is concrete used for?
3) What concrete is used for ordinary foundations?
4) What ingredients does concrete consist of?
5) Do you agree that cement concrete should be used at once?
6) May lime concrete be left for a short time before being used to ensure the slaking of all the lime?
7) What is one of the great practical difficulties that one meets working with concrete?
8) How can concrete be prevented from setting?
9) What are the differences in mixing large volumes of materials and small quantities?
10) Cement concrete which has partially set should be thrown upon one side, shouldn't it?

IV. Is it true or false?

1) Concrete is useful for foundations, walling, damp-resisting floors, lintols, and as a filling between steel framework in fire-resisting floors, and in flat and domed roofs.
2) For ordinary foundations, where there is no excessive weight to carry, lime concrete may be used, and a suitable mixture is as follows: 2 parts of ground stone or lias lime, 1 part clean sharp sand, and 4 to 6 parts broken stone, bricks, or well burnt ballast, small shingle, or slag.
3) Many natural stones, largely advertised and sold under high-sounding names, are nothing else than cement concretes.
4) It is not obligatory to use cement concrete at once.
5) Lime concrete may be left for a short time before being used to ensure the slaking of all the lime.
6) It is not difficult to mix materials in small quantities just sufficient for immediate use.
7) It should be remembered that chemical action begins with a cement as soon as water is added, and this action is not delayed by the addition of sand or other aggregate.
8) It follows, therefore, that cement concrete which has partially set should be thrown upon one side.

7. Reinforced concrete

I. Read and learn the new words to the text:

fiber – волокно, клетчатка
transparency – прозрачность
trait – свойство, характеристика
chip – стружка
ferroconcrete – железобетон
brittle – хрупкий, ломкий
inflexible – несгибаемый
adhere – придерживать
to mold - формовать
flakes – хлопья
spalling – растрескивание
to cure – отвердевать

II. Read and translate the text using the new words:

Reinforced concrete is concrete mixed with very strong materials that increase the strength under tension of the concrete, making it less likely to fail. The development of reinforced concrete dates to the mid-1800s, and it proved to be a revolutionary innovation in building design. Today, reinforced concrete is one of the most common building materials in the world for both entire buildings and key structural elements that need to be able to withstand substantial stress.

A specific type of reinforced concrete, known as ferroconcrete, is reinforced with metal bars, plates, or grids. Other materials, including plastics, fibers, and glass, can also be used to make concrete stronger. These alternative materials may be used in environments where specific traits like transparency to radio and resistance to spalling, where concrete chips or flakes, are desired. Usually the alkaline environment inside the concrete protects the reinforcing materials, although the materials can also be treated to resist corrosion if there are concerns.

This building material must be carefully engineered. If it is not reinforced enough, the concrete can be weak and subject to failure. On the other hand, loading concrete too heavily with reinforcing materials can make it inflexible and brittle. When working with concrete, people must walk a fine line that allows the concrete to resist tension and stress while still providing some flexibility that will allow it to give before it fractures or fails in other ways.

Reinforced concrete is a popular building material because it is very strong, easy to work with, and affordable. It is commonly used for foundations and structural walls, as it can support significant weight. Entire structures can be

made from concrete for reasons of cost or to meet a specific aesthetic need. This building material can be molded and shaped in ways that are not possible for some other materials, providing opportunities for innovative and visually intriguing design.

Materials used for reinforcement are usually roughly textured to encourage the concrete to fully adhere. This distributes the stresses throughout the concrete, reducing the risk of the development of hot spots of tension and stress. Builders must use concrete suitable for the application and take care to avoid problems, such as poor quality or bad curing conditions, that might compromise the reinforced concrete. If the concrete cures too quickly, is not handled well during pouring, or is made with bad materials, it can fail once it enters active use.

III. Answer the following questions to the text:

1) What kind of material is reinforced concrete?
2) When did development of reinforced concrete begin?
3) What is ferroconcrete?
4) Where is ferroconcrete used in?
5) What quality must reinforced concrete possess for the proper construction?
6) Is reinforced concrete strong, easy to work with, and affordable?
7) Why must people work with concrete, walking a fine line?
8) What can reduce the risk of the development of hot spots of tension and stress throughout the concrete?
9) What problems can builders face working with concrete?
10) Have you ever worked with concrete on a construction site?

V. Is it true or false?

1) The development of reinforced concrete began in the 20th century.
2) Ferroconcrete, is reinforced with metal bars, plates, or grids.
3) When working with concrete, people must walk a rough line.
4) Reinforced concrete is a popular building material because it is very strong, easy to work with, and affordable.
5) Materials used for reinforcement are not usually roughly textured to encourage the concrete to fully adhere.
6) It is good if the concrete cures too quickly.
7) Entire structures can be made from concrete for reasons of cost or to meet a specific aesthetic need.

8. Wood and its modification process

I. Read and learn the new words to the text:

perennial – вечный, многолетний
proprietary – патентованный, характеризующий чью-л. собственность
inherent – неотъемлимый, присущий, свойственный (in, to – кому-л., чему-л.)
board – доска, плоский предмет
to shrink – усаживаться, уменьшаться
to swell – надуваться, разбухать
to compromise – компроментировать, подвергать риску, опасности
lumber – амер. пиломатериалы, строевой лес, бревна
acetylate – ацетилировать
scads – разг. большое количество, масса, груда
hydrophilic – гидрофильный, водолюбивый
hydrophobic – гидрофобный
pulp – мякоть, кашица
affinity – сходство
to interact (with) – взаимодействовать
envelope – конверт, пленка
thermal – термический, тепловой
pervasive – проникающий повсюду, всеобъемлющий
cellular – клеточный, имеющий клеточное строение
waterproof – водонепроницаемый, непромокаемый
to shed – распространять, излучать, испускать
deck – любой тип настила, платформа
to soak – впитывать, всасывать
torrent – стремительный поток

II. Read and translate the text using the new words:

Perennial Wood looks like regular wood—because it is wood. What makes Perennial Wood so special is that it has been modified throughout on the molecular level to resist the harmful effects of moisture with proprietary TruLast Technology.

Using heat, pressure and an organic compound, TruLast Technology permanently expands the wood's cell walls to a fixed position—helping the wood minimize water absorption.

The result is that Perennial Wood boards and components remain straighter, smoother and harder, and are three times more resistant to shrinking and swelling—without compromising the wood's natural appearance.

The performance inherent in Perennial Wood is made possible through a wood modification process. But does this change the wood into something else? False. We are not alchemists. (We're scientists!) Perennial Wood is still wood — just modified.

We call this modification process TruLast Technology, a process based on wood acetylation.

TruLast Technology is a new development in the outdoor lumber business. But is it new science? The wood acetylation process we use today is based on the knowledge Eastman Chemical Company developed over the last 80 years of acetylating wood pulp.

Wood naturally contains scads of water-loving molecules (called hydrophilic groups) in its cellular structure. These hydrophilic groups help manage the movement of water through an organism, which is vital in a living tree. But in lumber, wood can swell as water binds with these groups. TruLast Technology, however, replaces these hydrophilic groups with hydrophobic (water-fearing) groups.

If it helps, think of the hydrophilic group as dog molecules and the hydrophobic group as cat molecules.

With little affinity for water, these new hydrophobic groups prevent water from binding to the wood. And no more swelling.

Acetylation, in other words, fundamentally changes the way water interacts with wood. The result is real wood that has been permanently changed at the cellular level to protect against swelling and warping, as well as rot and decay organisms.

TruLast Technology is not pressure treating or thermal modification. It's not a surface or envelope treatment. Rather, it's a pervasive change in the wood chemistry, protecting wood in a whole new way by creating a physical and cellular barrier to water transport.

If you think it is mere waterproofing, well, that would be false. Liquids will still soak into the empty channels of Perennial Wood. It simply doesn't swell. (And because it's not waterproofing, that means traditional paints and stains still work with Perennial Wood.)

So even if a big wet dog continues to shed a torrent of spray on your deck or you experience decades of rain and snow, your deck made of Perennial Wood will remain stable – even down to the molecular level.

III. Answer the following questions to the text:

1) What do you know about TruLast Technology? Have you heard about it before?

2) What process is TruLast Technology based on?

3) Tell some information about TruLast Technology process.

4) How does acetylation change the wood?

5) What other technologies do you know?
6) Is Perennial Wood waterproofing?

IV. Complete the following sentences:

1. Using heat, pressure and an organic compound, TruLast Technology…
2. The result is that Perennial Wood boards and components remain straighter…
3. We call this modification process TruLast Technology…
4. The wood acetylation process we use today is based on…
5. Wood naturally contains…
6. TruLast Technology, however, replaces…
7. Acetylation, in other words, fundamentally changes the way…
8. So even if a big wet dog continues to shed a torrent of spray on your deck…

V. Is it true or false?

1. Perennial Wood doesn't look like regular wood.
2. Using heat, pressure and an organic compound, TruLast Technology permanently expands the wood's cell walls to a fixed position—helping the wood minimize water absorption.
3. TruLast Technology is new science.
4. Wood naturally contains scads of water-loving molecules (called hydrophilic groups) in its cellular structure.
5. TruLast Technology is pressure treating or thermal modification.
6. It’s not a surface or envelope treatment.

9. Preservation of wood

I. Read and learn the new words to the text:

to utilise – использовать
stain – пятно
moisture – влага
schedule – распорядок, график
pressure – давление
fluctuation – колебание, перепады
distinctive – отличительный, своеобразный
The Bethell – after John Bethell, 19th century American inventor : a method of preserving wood.
radiata pine – сосна лучистая
penetration – проникновение

the Rueping process – after Max Rüping, 20th century German timber engineer, its originator.

hazard – риск, опасность
retention – удерживание
application – применение
Boron esters – эфир Бора
kiln – печь
dimensional – пространственный
volatile – непостоянный, изменчивый
solvent – растворитель, растворяющий
spray – распылитель
dip – глубина, основание
to stack – нагромождать
fillet – утолщение
vapour – испарение
diffusion – диффузия, рассеивание
precipitate – осадок
leachable – выщелачиваемый

II. Read and translate the text using the new words:

There are a number of types of treatment techniques utilised in wood preservation:

Pressure Impregnation – uses vacuum and pressure to obtain chemical penetration of permeable timbers, while controlling the amount of preservative retained. The timber must be free of stain and have a moisture content of less than 25%. Many treatment schedules are used, the pressure fluctuations and timing being distinctive in each.

The Bethell process is the most important of the treatment processes and achieves about 90% of the theoretical maximum uptake in radiata pine. The Lowry treatment is designed to achieve maximum penetration with a low retention of preservative. Retention is around the 60% of theoretical maximum. The Rueping process is used principally with preservative suspended in hot oil such as creosote and PCP where a low net retention is desired for some hazard categories. Net retention here is as low as 40-50%. The Alternating Pressure method utilises repeat applications of pressure and vacuum to force preservative into green wood.

Vapour Phase – utilises the fact that some Boron esters boil at low temperatures. The liberated gas can be drawn into timber where it reacts with water and condenses. For this reason, timber must be very dry (<5-6% moisture content) or only low penetration is achieved. Treatment of framing timber in the drying kiln is possible and can offer considerable cost savings.

Vacuum treatments – utilise volatile organic solvents to transport the preservative into the wood. It is designed to treat dry profiled or machined

wood. TBTO is typically used, being introduced to the timber by either a double vacuum or low pressure cycle. The advantage of this technique is that there is no dimensional swelling as associated aqueous treatments and the wood can be painted within a couple of days of treatment.

Diffusion - is used to introduce boron salts to green timber. The timber is sprayed or dipped in the preservative solution and block stacked (without fillets). The wood is then tightly wrapped and left for a number of weeks during which the boron salts diffuse into the wood. Thicker timber may require a second dip to top up the salt levels. For this technique to be successful the timber must have a moisture content of over 50%. If even just the timber surface dries out, the process may not work at all, or be uneconomically slow. Another method using the diffusion process is called double diffusion. This works in the same manner except two successive chemical treatments are used. The second chemical treatment (Na^2Cr^2O7/Na^2CrO^4 and Na^2HasO^4) precipitates with the first ($CuSO^4$) to form a non-leachable preservative.

III. Answer the following questions to the text:

1) How many types of treatment techniques are there in wood preservation?
2) What does pressure impregnation mean?
3) What processes are used in pressure impregnation?
4) What process of the treatment is the most important?
5) For what reason must timber be very dry in vapour phase?
6) Do you know the advantage of technique vacuum treatment?
7) What can you tell about diffusion process?
8) Is there another method of diffusion?

IV. Complete the following sentences:

1. Pressure Impregnation - uses vacuum and pressure…
2. The Bethell process is the most important of the treatment processes…
3. Lowry treatment is designed to achieve maximum penetration…
4. The Rueping process is used principally with…
5. The Alternating Pressure method utilises repeat applications…
6. Treatment of framing timber in the drying kiln is…
7. Vacuum treatments - utilise volatile organic solvents…
8. The advantage of this technique is that there is no…
9. Diffusion - is used to introduce…
10. Thicker timber may require…
11. Another method using the diffusion process is called…
12. The second chemical treatment precipitates with…

10. Granite

I. Read and learn the new words to the text:

igneous – вулканического происхождения
intrusive – интрузивный, интрузивные (породы)
aggregation – скопление, объединение
feldspar – полевой шпат
mica – слюда
undoubted – несомненный
sedimentary – осадочный
constituent – составляющая компонента
crumbling – осыпающийся, разрушающийся
exposure – воздействие
bed – полотно
mason – каменщик
reliable – надежный, достоверный
sulphur – сера
to disintegrate – разрушаться, распадаться
to wedge – расклинить, втиснуть
accessory – вспомогательный
polish - полировка, шлифовка
to retain – сохранять
to blast – взрывать
wage – заработная плата
sparingly – умеренно, экономно
externally – внешне, снаружи

II. Read and translate the text using the new words:

Granite, generally considered as igneous and intrusive, is, however, thought by many to be of sedimentary origin. It is a holo-crystalline aggregation of quartz, felspar and mica, its chemical composition varying with its mineral contents; and no less than 44 accessory minerals occur in it in varying proportions. Orthoclose, or potash felspar, is generally its principal constituent; its colour varies from white to flesh-red, and its grains are irregular and sharply defined. It is usually thought to be a weather stone of undoubted quality; but this is not by any means always the case. Some granites are no better weather stones than the softer oolites, crumbling in the hand after a few years' exposure, and although most English and Scotch granites are reliable in this respect, the opinion of a mason accustomed to granite working should be sought where doubt exists. If exposed to fire it disintegrates badly. It is very little used in building.

Granite is extensively worked, generally in large, open quarries. The beds as a rule are very thick; but still, horizontal beds do occur at intervals, and these often contain a very thin layer of sulphur. If, as sometimes happens, vertical joints of the same nature are found, the great natural blocks can be wedged apart. Otherwise, and more frequently, it is necessary to blast.

A large amount of excellent granite, grey, blue and red, is now imported from Norway and Russia, as, owing to the low rate of wages obtaining in those countries. Amongst this is a granite, nearly black in colour, containing large crystals, which have a peculiar "flash" when polished, which, if introduced sparingly, may be used amongst other stones with good effect. There is doubt whether these foreign granites will retain their polish and colour well externally.

III. Answer the following questions to the text:

1) What is the origin of granite?
2) What does granite consist of?
3) Is it a weather stone of undoubted quality?
4) Is granite often used in building?
5) What can you say about the beds of granite? Are they thick or thin?
6) What countries is granite imported from?
7) What granite has large crystals?

IV. Is it true or false?

1) Granite is of non-volcanic origin.
2) Some granites are better weather stones than the softer oolites, crumbling in the hand after a few years' exposure.
3) Granite is very much used in building.
4) Granite is extensively worked, generally in large, open quarries.
5) A large amount of excellent granite, grey, blue and red, is now imported from the USA and Spain.
6) If, as sometimes happens, vertical joints of the same nature are found, the great natural blocks can be wedged apart. Otherwise, and more frequently, it is necessary to blast.

11. Basalt

I. Read and learn the new words to the text:

worth while – стоит
owing to – благодаря
columnar – колонный, столбовой
to come out – выходить

split – раскол, разделение
hammer dressed walling – кладка из грубо отесанного камня
plinth – плинтус
basement – подвал

II. Read and translate the text using the new words:

Basalt**,** being hard and difficult to work, and mostly found in places from which transport is difficult, is little used structurally; and, as it has never been worth while to put down expensive plant, the method of quarrying is elementary. Owing to its columnar structure, it comes out of the quarry in long prisms. These, if placed on their sides and bedded in cement, make an excellent facing for sea-walls, where weight and indestructibility are primary considerations, and for this purpose they have been used in some parts of Ireland. A decorative dark green Basalt which comes out in large beds, splits readily, and polishes well. Used structurally, it makes good hammer dressed walling, especially for plinths and basements.

12. ROOFING SLATE

I. Read and learn the new words to the text:

roofing slate – кровельная плитка
slate – сланец, шиферная плитка
quarry – карьер
flaw – недостаток, изъян
evenness – равномерность
perceptibly – ощутимо, заметно
edge – край, грань
odour – запах, аромат
breakage – повреждение, разрыв
enamelling – эмалирование
wheel – колесо
oven – печь, духовка
chimney – труба, дымоход
rubbing bed – трущаяся поверхность
slab – плита
rack – стойка, подставка

II. Read and translate the text using the new words:

Roofing slates are sorted at quarry according to size and weight, and not according to the trade names by which certain sizes have become known; and

the sizes obtainable are much more varied than is generally supposed. While the larger sizes only are used in London to any extent, they are scarcely known in the North of England and Scotland, where small sizes are much preferred: Roofing slates are known as “Firsts”, “Seconds” and “Thirds”, the quality depending on freedom from flaws as well as upon evenness of colour and thickness, it not being always the thinnest slate which is the best.

If good slate be stood in water, the damp should not rise at all perceptibly up its edge above the water line, even in 24 hours; while in a bad slate it will rise as much as 2 ins. in ten minutes. A bad slate, also, will give off an earthy odour when wetted, and when struck will sound dull, while a good slate gives off a sharp metallic ring. Slates are sold from the quarry by “long tally” that is, per thousand of 1,200, with 60 extra to allow for breakage, making a total of 1,260 to the thousand. By the time they reach the builder, a thousand usually consists of 1,200 only.

American slates have been imported and largely used in cheap work of late years. They are mostly blotchy, and of unpleasant purple, green, or red colour. Portuguese slate is imported, mostly for enamelling for it lacks some of the qualities necessary for a good roofing slate. It is somewhat earthy, but is soft to work, is easily brought to a smooth surface, and stands well the temperature of the ovens. Enamelled slate is used principally for chimney pieces. The slate, after being planed, is placed on a rubbing bed before the colour is applied. The colour first used is black, and with this the whole surface to be enamelled is covered. As this is done, the slabs are arranged in iron racks so that the air can get all round them, and the racks, running on tram lines, are wheeled into large ovens and subjected to a dry temperature of about 300 degrees F.

13. Marble

I. Read and learn the new words to the text:

masonry – кирпичная кладка
marble – мрамор
to lever – поднимать рычагом
premises – помещение, дом
convenient – удобный
statuary – скульптура, статуя
invoice – накладная, счет-фактура
blasting – взврывной, струйный
saccharine – сахаристый
linings – накладки
counter – счетчик, противодействие, противовес
top – вершина

internal – внутренний
to retain – сохранить
wall-linings – облицовка стен
chancel – алтарная часть
obtainable – доступный, достижимый
gantry – балка мостового крана
shed – навес

II. Read and translate the text using the new words:

Marble masonry is a thing to itself, requiring heavy machinery and infinite patience. The blocks are lifted from barges by a crane running on a gantry, and are deposited under cover in a large shed, the power employed for this and all the other machinery being electricity generated by a dynamo driven by a gas engine, the gas for which is made on the premises.

Marble is in some cases easily quarried, as it occurs naturally in blocks of convenient size, needing only to be levered out; but more frequently blasting or wedging have to be resorted to. Foreign marble generally reaches England in roughly-squared blocks, but the more valuable statuary marble of Italy is sent over just as it is obtained from the quarry, and is invoiced neither by weight nor cubic content.

Most of the white marble now used for statuary comes from Italy. Carrara marble is best known, with its sugar-like structure, but the Serverezza marble, which is glassy rather than saccharine in fracture, is almost to be preferred. Of late years a white marble, slightly veined and so not suitable for statuary, has been imported from Norway for use in thin slabs as wall linings and counter tops. Most of the veined marble in common use at present comes from the Pyrenees, whence many colours and most beautiful markings are obtainable, impossible to classify, and only to be selected from samples. The best known coloured Italian marbles are yellow, that from Verona light and pure in tone, and that from Sienna of deeper tint with purple markings. Greece produces a very fine green marble, known as Cippolino, which, however, requires expert cutting if the marking is to be displayed to advantage. The most beautiful marble known, probably, is also green, with crystals of white set in it as if it were a natural mosaic.

Another beautiful green marble is the Connemara, from Ireland, but it is not obtainable in very large blocks; and other true Irish marbles are the rich Cork red, the Kilkenny black and white, and the Galway black. Many different colours are obtainable, the tints being as a rule delicate rather than striking, making it suitable for internal wall-linings, chancel floors and steps, and other decorative uses. Purbec "marble" is really a hard, South of England limestone, capable of receiving a good polish, which, however, it does not retain very well.

14. ARTIFICIAL STONE

I. Read and learn the new words to the text:

aggregate – заполнитель
thoroughly – тщательно
to avoid – избегать
to arise – возникать
angle – угол
window sill – подоконник
pumiceous – пемзовый
indurated stone – отвердевший камень
trass – трассовый
conglomerate – многокомпонентная масса
trowel – мастерок, лопата
porosity – пористость
mould – слепок
soluble – растворимый
to render – передавать, оказывать
proof – стойкий
caustic soda – едкий натр

II. Read and translate the text using the new words:

There are three classes of artificial stones now made Simple Cement Concretes, Cement Concretes which have been subjected to some hardening process, and Chemical Stones. Most of them are composed of a granite aggregate with a matrix of Portland cement, and are either laid in situ or cast in moulds for such purposes as steps and window sills. They have the advantage over ordinary concrete that they are made by the skilled workmen of firms who have a specialist's reputation to lose. One of the simple concretes, "Basaltine stone", differs from the others in that the aggregate is composed of basalt chippings, while trass, a pumiceous conglomerate of volcanic origin, is mixed with the cement.

The hardened concretes include "Victoria stone", "Imperial stone", "Empire stone", "Indurated stone", and others. Of these, "Victoria stone" which has an excellent reputation of long standing, may be considered to be typical. Of these, "Victoria stone" which has an excellent reputation of long standing, may be considered to be typical. The aggregate used is finely-crushed and well-washed Leicestershire granite, having the following analysis. Three parts of aggregate are thoroughly mixed with one of selected and tested Portland cement in a dry state by machinery, and the water then added in a careful manner, so as to avoid the danger of washing out any of the fine and more soluble portions of the cement; and before any initial set of crude concrete mixture can arise it is put

into the moulds, in which it is carefully worked with the trowel, so as to fill up the angles and sides, thus ensuring accurate arises all round.

The moulds are made of wood, which are lined internally with metal, not only to secure accuracy of form, but also to render them durable, and proof against liability to distortion. The moulds, filled thus, are allowed to remain on the benches of the moulding sheds until the concrete has sufficiently set, and a certain amount of the water of plasticity evaporated. The slabs, when sufficiently dry, are relieved from the surroundings of the moulds; which, being made in pieces, can be readily detached by unscrewing the fastenings. The slabs are then taken to a tank in the silicating yard (protected from the weather), placed side by side, and covered by a silicate solution of silicate of soda, where they remain for a period of time which depends on the condition of a slab and its capacity of absorption. About 14 days, under ordinary circumstances, is regarded as sufficient. The slabs, after being taken from the tanks, are stacked in the store yard, where they remain to season, and are taken away in the order of their age. The machinery required for the conversion of the crude silica into silicate is of a very simple character, consisting of a pair of iron-edged runners to reduce the silica stone, and a series of jacketed boilers, to which steam of the required temperature is supplied, caustic soda obtained from the best sources being added. The resulting "stone" is one of the best paving materials known, being practically non-absorbent, its porosity being only 13%, and wearing evenly and very slowly under the tread.

15. SAND

I. Read and learn the new words to the text:

abundance – изобилие
earth's crust – земная кора
effervescence – бурное вспенивание
impalpably – неосязаемо
mortar – раствор
grit – гравий
sieve – сито
meshes – сетки
scraping – соскабливание

II. Read and translate the text using the new words:

Sand is generally confined in its use to those of quartz (almost pure silica), which are found in excessive abundance in the earth's crust. While a white colour is generally an indication of purity of the quartz, it may possibly be due

to the presence of carbonate of lime, usually in the form of chalk, which, however, can readily be detected by its effervescence if some be placed in a saucer and acid (hydrochloric or nitric) be poured over it. Any colour, ranging from the lightest tint of yellow to a deep red, will in almost all cases be due to the presence of oxide of iron as an impalpably thin coating to the silica grains, the depth of the colour being an indication of the amount of iron oxide which is present. It has no appreciable effect upon the value of the sand for building purposes, except so far as colour is of importance.

Angularity of grit, or sharpness, is generally considered an essential quality of good sand. Fineness of grain is often also essential, especially for the finishing coats of plaster, and to secure it sifting has to be resorted to; but for coarser work it is better to have both coarse and fine particles in the sand, that the crevices between the coarse particles may be filled. Good building sand should be of pure quartz only, with grains of known sizes; for instance, such as will pass through a sieve of 900 holes per square inch, and caught on one of 1,600 holes. It is only by adopting some such specification for a sand that the best results are to be obtained in making mortar.

The presence of loam, although it renders sand easier and therefore cheaper to work, if in sufficient quantity to be detected by the touch, or the appearance, or by leaving a stain when rubbed between damp hands, is distinctly harmful, as it will irretrievably destroy even the best cementing material. It should then be removed by washing; but the effect of washing naturally good sand is scarcely appreciable, as is shown by the following tests made, on briquettes composed of 2 of sand passed through a sieve of 900 meshes per square inch to 1 of cement. The best possible way to wash sand for the removal of clay or loam is in a running stream, the force of which is just enough to remove the mud and very fine sand, leaving the fine grit and coarser particles behind.

Sand is sometimes sifted and washed by placing it in a sieve held in a tub of water. A quick horizontal motion from side to side causes the smaller grains to pass through the sieve and fall to the bottom; but much dirt is in this way carried down with the sand, so that the process is not to be recommended. It is supposed that the mud remains suspended in the water until it is poured off, and the coarse stuff remaining in the sieve is rejected as being unfit for the work; as a matter of fact, much of the mud is deposited with the fine sand, rendering it quite unfit for mixing with lime or cement.

If sand contain salt it may be removed by constant washing in running clean fresh water. The most convenient way to effect this is to construct a washing-tank in the ground, about 6ft. square and iSins. deep, lined with brick in cement. The sand should be filled into this to a depth of 10 ins. or 12 ins., and a stream of water turned on it. A brown frothy scum soon rises to the surface. The sand should be constantly stirred. When the water runs off clear, and without having a saline taste, the sand may be removed for use. It is well to bear in mind that the individual grains of sand contain no salt; that the salt merely coats the grains or

lies between them, having been deposited there by the evaporation of salt water; that the salt is soluble in water, and may be entirely removed by careful washing; and sea sand so washed is quite as good for building as any pit or river sand of equal fineness and smoothness of grain.

Other methods of "killing" or neutralising the effect of the salt in sea water have been tried at various times, but they have hardly proved successful. Salt is the most harmful substance which sand can contain. It has so great an affinity for moisture that a wall in which it is used is rendered permanently damp. Any sand which is salt to the taste, including all sea sand and a good deal of pit sand, dug from comparatively recent under-sea deposits, should consequently be rejected for all purposes other than for use under water, unless it be first properly washed. Sea sand is also generally rounded by attrition, and consequently wanting in sharpness; and so to a less extent is river sand. Pit sand is of all qualities, it being impossible to lay down any rule. An excellent sand is obtained in the process of washing decomposed granite for the extraction of kaolin, but it is only used locally, the cost of transport being prohibitive.

Sand does not absorb water in any appreciable quantity, its bulk is not diminished or increased by cold or heat, and does not contract in drying; therefore the greater the quantity of sand used in mortar in proportion to lime, the less probability there will be of the mortar shrinking and breaking. In erecting new walls on the site of old ones, it is usual to work up the old mortar as sand; but this should not be allowed, as in nearly every case the old mortar, through being made with loamy sand, is valueless for the purpose, and will, if mixed with clean sand, only injure it.

The use of old mortar has this to recommend it a much smaller quantity of lime will make it into a working paste than will be required from clean sand. Road-scrapings from hard roads are frequently used with lime instead of sand to make mortar; but as the proportion of grit in them is so small, compared with the mud, horse droppings, and other filth, they do not make good mortar. Scrapings from soft roads are simply mud. Burnt clay, bricks, tiles, and soft stone are frequently broken up and ground to be used instead of sand. These, if free from dust, make a quick and fairly hard-setting mortar; but, unlike sand, they are porous, and consequently will absorb water Mortar made with them is liable to crack and shrink in drying, and where a waterproof wall is required, they should never be used instead of clean, sharp quartzose sand.

PART III. TEXTS FOR INDEPENDENT TRANSLATING

BRICKS

Bricks are small artificially made building blocks, usually, though not invariably, made of clay in moulds, and raised to a high temperature, with the effect that the soft clay is converted into a hard material, which wears and weathers well, the silica and alumina of which, together with water, oxide of iron and carbonate of lime, the clay is composed combining in very complex manner. As different clays vary greatly from one another, no two being alike, it is not possible to give a general analysis; nor will analysis always denote how the clay will behave during brickmaking. This can only be determined by experiment, which is often extremely costly. Roughly speaking, however, the alumina gives the plasticity necessary to enable the clay to be moulded; the silica prevents undue hardness and shrinkage; the oxide of iron helps to bind the brick and is its principal colouring ingredient; and the carbonate of lime is a binding material. The plasticity also depends upon the water.

Any hard and well-burnt brick will suffice for foundations and for internal work which is to be subsequently covered; and for such purposes the cheaper and rougher bricks are frequently the more useful, as affording a better key for plastering than those with a smooth surface, and often being better weight-carriers than soft, well-finished, hand-made facing bricks.

Sandy and absorbent bricks should not be used in foundations, nor in external walls where likely to be exposed to driving rain. Such bricks are generally soft and do not weather well, being frequently underburnt; and by retaining moisture they encourage the growth of lichen and climbing plants, which all gather and retain damp. Soft, underburnt bricks are valueless. No brickmaker with a reputation to lose will sell them, preferring to pass them through the kiln a second time, or to crush them for sand.

On the other hand a markedly non-absorbent brick, heavily pressed and highly burnt, may have too smooth a face to adhere readily to mortar, especially in summer time, in spite of good wetting. Over-burnt bricks will melt and run together, forming burrs which are useless except to be broken up for road metal or concrete. Faulty bricks are more often met with amongst those which are hand made, hack dried and clamp burnt than amongst those which are modern machine made, chamber dried, and kiln burnt. To tabulate the many different kinds of bricks now made in England would be an almost hopeless task. On the other hand, those which are used in London are commonly, and in a very general manner, classed as either Stocks, Flettons, Sand-faced bricks, Rubbers, Pressed bricks, Blue bricks, Glazed bricks, or Clinkers.

BRICK WORK

So far as possible the standard size of a brick, with a sufficient allowance for joints, should be used as the unit for all dimensions. Thicknesses of walls must, consequently, be in multiples of 4 ins. (half a brick). Lengths may, without cutting unduly, be in multiples of 2j ins. (the width of a closer), though any lengths can be obtained by cutting and rubbing. Heights should all be in multiples of 3 ins. (the thickness of a brick), to avoid the necessity of packing with pieces of tile or broken chips of brick.

Receding courses, as in footings, are preferably built in headers in 2 J-in. off-sets; and so are corbel courses if they have any weight to sustain. If backing and facing are of different kinds of bricks, they should be so selected in thickness as to bond properly, due allowance being made for the finer joint used in external work. Unless there be very strong reason to the contrary, all cants, squint quoins, and bird's-mouths should be worked to the angle of 45 degrees. For all other angles the bricks have either to be rubbed or specially made. Bricks of unusual sizes and of special contour are always to be obtained by having them specially made, but as a general rule their cost is prohibitive.

Rigid adherence to such mouldings and enrichments as are easily procurable is the only safe rule where means are limited. Keep in mind the standard sizes of the bricks you will use when planning. Thoroughly sound bond can only be secured if the distances between openings, and between cross walls, and the widths of openings, are arranged to brick dimensions.

If these be not adhered to, bricks must be rubbed to fit or are more often roughly broken and the bond destroyed. This is particularly necessary when using hard, pressed facing or glazed bricks. Uniformity of colour, where required, is only to be obtained by using bricks from the same maker. Thus it would be unwise to make up a group of mouldings from the catalogue sections of several different firms. All bedded timbers should be to brick dimensions so far as they are enclosed in brickwork. Rubbed and carved work should be so devised that all bricks can be worked down to fit from the bricks to be used.

ARTIFICIAL STONE BRICKS

Artificial stone bricks are made by some of the firms that manufacture artificial stone, and partake of the same characteristics.

Slag bricks are made directly from the slag from blast furnaces. The slag, as it is run from the furnace, is poured into iron “jackets”, which have no bottoms, but rest on the iron table of bogeys, all joints and the outlet being pugged with clay. The bogeys are wheeled, when full, with the aid of small locomotives, in front of a large horizontally revolving wheel, attached to the circumference of which are a number of cast-iron moulds, into which the slag is poured from the jacket in rotation. As the wheel revolves, the bricks cool sufficiently for the

moulds to be opened so that they drop out, the moulds being then ready to be refilled as they again pass in front of the jackets; while the bricks are thrown without fuel into an annealing oven, whose doorway is bricked up when it is full, and there left to cool gradually. The bricks produced are hard and heavy, glassy in structure, cream-coloured externally, and blue on fracture. They are used for paving purposes, especially for street crossings, while curbs and channels are also cast. Unfortunately they often contain bubbles, but they are absolutely impervious to moisture and admirably suited to resist wear. The moulding is rough, and many of the bricks are spoilt in manufacture.

TIMBER AND ITS TIMBER CLASSIFICATION

The best timber is obtained by felling the tree at the age of maturity, which depends on its nature, as well as upon the soil and climate. The ash, beech, elm, and fir are generally considered at their best when of seventy or eighty years' growth, and oak is seldom at its best in less time than a hundred years; but much depends on surrounding circumstances.

As a rule, trees should not be cut before arriving at maturity, because then there is too much sapwood, and the durability of the timber is much inferior to that of trees felled after they have reached their full maturity. From what has already been said of the essential difference between sapwood and heartwood, it will be readily understood that no amount of seasoning or drying will convert the one into the other. All the same, the strength of many woods is nearly doubled by the process of seasoning. Hence it is thriftless to use timber in a green state; especially as it is then not only weak, but liable to warp, twist, and shrink while it slowly parts with the contained moisture, as it will do eventually.

To a certain extent this liability exists even in well-seasoned timber, fresh shrinkage and sometimes warping taking place whenever a fresh surface is exposed by planing, and warping being experienced if the wood be damped. It is accordingly customary to have joinery worked up and lightly wedged together long before it is needed, that any correction for such changes of shape or size may be made before the work is finally wedged and glued up. Whole logs of timber, if left exposed to changes of atmospheric conditions, particularly to hot sunshine, are very liable to split. They should either be cut up, either into quarters or preferably into scantlings, and set to season; or else be totally immersed in water until this is convenient. All wood darkens on exposure to light, especially direct sunshine.

Good timber should be uniform in substance, with straight fibres and annual rings of regular form and size, smelling sweet when fresh cut, even and bright in colour, with a silky lustre when planed, the strong grain appearing to rise to the surface; and it should be free from large or dead knots, shakes, spongy hearts, porous grain, sapwood, or other defects. Thus it is often specified, but in practice the absence of all defects is rarely to be met with, and discrimination

must be exercised, remembering that trees will not necessarily grow to meet the requirements of a theoretical specification. It is often said that narrow annual rings, which betoken slow growth, are a sign of strong timber; but this only holds good for wood of the same botanical species grown under the same conditions of soil and climate. Timber which is woolly under the plane, or which clogs the teeth of the saw in working, is unreliable, while if a musty odour be emitted it is a sign of incipient decay, and a dull, chalky appearance is also a sign of bad timber. Good timber is an excellent conductor of sound. The ticking of a watch applied at one end of a balk should be distinctly heard if an ear be placed against the other end; while imperfections in timber in position can be detected by positive differences of sound produced by tapping. Perfect parts will strike solid, surface shakes will rattle or "answer" to the slightest touch, and deep shakes will give a hollow sound, while live knots will sound short and crisp, dead knots answering faintly or rattling.

All building timber may be broadly classed under two heads, soft woods and hard woods; the terms soft and hard, however, being used in a very general sense, some of the so-called soft woods being harder than some of the hard woods. This comes about through the term soft wood being applied, as a popular name, to all timber of the natural order of Coniferce that is, to all timbers which in their growing state are cone bearing, and have spikes instead of leaves all others being known as hard woods. The following classification of timber is now accepted:

Class I. Soft wood or pine wood, having very distinct annual rings, one part of each ring being hard and dark and the other soft and light coloured, while the pores are filled with resinous matter. Pine, Fir, Larch, Cowrie, Cedar, Cypress, Yew, and Juniper all belong to this class.

Class II. Hard wood or leaf wood, the various examples of which may be subdivided. When more detailed classification is attempted, however, the confusion which exists in nomenclature introduces an element of extreme difficulty, which is accentuated by the fact that, in the ready-converted form, it is often almost impossible to distinguish between even botanically different timbers, to say nothing of botanically similar timbers sold commercially under different names and shipped from different ports. This is especially the case amongst the soft woods, which are almost exclusively used for ordinary building work to such an extent that the great forests of Northern Europe have been nearly denuded of well-grown timber, so that large balks, free from sap-wood, are hardly obtainable; which is scarcely surprising, considering that a well-grown pine tree takes from 180 to 300 years to reach maturity, according to climate, and that the slower-grown timber is generally the best.

STEEL

There is another important method of manufacturing hard steel, such as tool steel, known as the cementation process, but it is not intended to do more than refer to it here. We may, however, note that by its means steel is produced from wrought iron. This only allows of the use of pure haematite ores, as others contain phosphorus, and this can only be eliminated freely in the presence of a base capable of forming a stable phosphate with the oxidized phosphorus. As non-phosphoric ores are comparatively rare and costly, a basic lining is therefore more commonly used, consisting of dolomite, and to produce the best results with such a lining the ore should not only contain phosphorus, but this element should be present to a fairly rich extent.

It is first heated by a charge of burning coke, which is raked out, and then, if its lining be basic, a proportion of quicklime, of from 10 to 15%, by weight of the total charge, is introduced, and the molten iron is poured in. If the lining be acid, the quicklime is not needed. The blast is now introduced, and the converter is turned into a vertical position. The blast is continued for about 18 or 20 minutes, during which time important chemical changes take place, which can be followed by the colour and character of the flame and sparks emitted, resulting in the almost complete removal of impurities, including the carbon, when a stream of white-hot nitrogen from the air of the blast alone escapes.

STEEL DESIGN

The design of steel chimney can be done as two types: Self-supporting steel chimneys Guyed steel chimneys. Self-supporting steel chimneys: When the lateral forces (wind or seismic forces) are transmitted to the foundation by the cantilever action of the chimney, then the chimney is known as self-supporting chimney.

Braced frames and moment resisting frames are used in building and other structures subjected to lateral loads to provide stability or collapse will occur. This is particularly obvious for very tall structures where the lateral forces are the most important design consideration. There are many methods available for stabilizing structures as shown below.

Steel concrete composite beams consists of a steel beam over which a reinforced concrete slab is cast with shear connectors. In conventional composite construction, concrete slabs are simply rested over steel beams and supported by them. These two components act independently under the action of loads, because there are no connection between the concrete slabs.

Tension members are considered to be carrying only axial force. Tension members are subjected to uniform stress because their entire cross-section is used for carrying axial forces. Ties, suspenders of cable stayed and suspension

bridges, building suspenders hung from central core, sag rods of roof purlins, members of trusses etc. are examples of tension members.

For a structural designer, it is most important to ensure that the structures and facilities designed by him are: Fit for their purpose Safe Economical and durable. Thus, safety is most important responsibility of a structural designer. But it is more difficult to say how safe a design is, because of natural variation of material.

ROCK ASPHALT

Rock asphalt is used for the formation of roadways and pavements. For the purposes of the manufacture of the compressed asphalt the rock is received from the mines in blocks of irregular shape, which are first subjected to a crushing process in a steam crusher and broken to the size of walnuts. The material is then passed on to a machine called a disintegrator, which reduces it to powder. The powder issuing from the disintegrator is received on an inclined screen which allows the fine powder to drop through, while any grains too large for the meshes are carried over and conveyed back to the disintegrator to be reground. The powder thus obtained is deposited in a covered shed; when required for use it is heated in slowly- rotating cylinders over a fire of wood or coal until it reaches the right temperature for laying; this process takes two or three hours. The mastic, which is supplied in blocks, is manufactured by pulverising the natural rock in exactly the same manner as for the compressed asphalt. This is run into moulds, and when cool again consolidates into a hard elastic block, which is used in varying proportions with grit and refined bitumen for laying pavements.

In the laying of roadways with the comprime the method adopted is as follows: The roadway is formed with a bed of good Portland cement concrete, and evenly finished off to the precise contour of the roadway required. When this concrete has become thoroughly set, and become hard and dry, the powder, which has been previously cooked, is brought to the site whilst hot; and as asphalt in bulk retains the heat undiminished for several hours it can be easily conveyed in properly constructed carts from the cookers to the site, where it is spread and raked over to a uniform thickness, usually two-fifths to three-fifths more than the depth of asphalt prescribed for the finished road.

The compression of the powder thus spread is effected by men with iron rammers, which have been previously heated in a fire to about the same temperature as the asphalt powder. After this has been accomplished and the mass reduced down to the finished thickness, the final smoothing is done by an iron instrument of curved form heated to an extent sufficient to soften the bitumen at the surface of the asphalt, and thus gives a fine finish and a glassy appearance to the whole.

The work is then complete, and as soon as it is cooled to the temperature of the atmosphere the road can be thrown open to traffic. It can easily be seen that the whole operation of laying is one that calls for much special skill and practical dexterity for its efficient performance. Roadways thus formed are very good, being nearly noiseless, cleanly, and impermeable to moisture. They also diminish to the utmost the force required for traction, and are durable; but constant traffic is necessary to keep the asphalt compacted, and it is consequently unsuited in this form for roofs, gutters, and many other building purposes.

CEMENT MORTAR

Cement mortar needs still different treatment. It should not be mixed in a mortar mill because of the great risk run of grinding being prolonged after setting has commenced.

The ingredients should first be mixed dry in a small heap, being turned over at least twice. Just sufficient water (about 15%) should then be added through the rose of a watering can, the mixture turned over once again and used immediately at any rate, within half an hour of mixing, and much sooner than this if the cement be quick setting. Neat cement is generally mixed with just enough water on his palette by the bricklayer himself only a few minutes before it is needed. The bulk of mortar is about 25%, less than that of the ingredients of which it is composed when separate and in their dry state. This is due to the interstices between the grains of sand being filled with the lime or cement and water, which are almost, and sometimes entirely, absorbed in this way.

Once mixed, all mortar should be placed in a tub or on a wooden platform to keep it clean until required for use. Only so much should be mixed at one time as can be used before it commences to set, and any which has begun to stiffen should be rejected. Unfortunately it is easy to throw into a mortar mill any which has been exposed through a night and has thus begun to set, and to mix it up with a little fresh lime and use it, and a good deal of indifferent work is traceable to this cause. Moisture assists the setting action of all hydraulic limes and cements, while if deprived of its moisture before setting has taken place a mortar will revert to its original constituents and become mere inert sand.

Consequently in hot weather all brick or stone used in building should be well soaked, else the moisture will be rapidly drawn from the mortar into the thirsty bricks, and setting will not take place this being more apparent in mortars made with slow setting limes than in those made with the quicker setting cements. In all cases work executed in damp earth or under still water becomes eventually harder than that done in air. Frost also rapidly destroys unset or partially set mortar. In frosty weather work must either be stopped or executed in a cement mortar which will set more quickly than it will freeze.

Mortar should be used of as stiff a consistency as possible, all beds being even, all surfaces covered, and all joints flushed up that is, in walling. A liquid mortar, known as grout, is often poured over the surface of a brick floor and swept over it with a broom so as to penetrate every crevice, but it should not be employed in walling; for, though excessively rapid work can be done by laying a thick bed of soft mortar and running the bricks along it into place, the practice is far from commendable.

GRAVEL

Gravel is an extremely coarse sand, as a rule composed to a large extent of rounded pebbles. As found in Nature it generally ranges in the same deposit from fine sand to stones of 3 ins. diameter and more, and in this condition is useful for many purposes; while for others it is "screened", or thrown against an inclined sieve having a wide mesh of strong wire. If a tolerably fine screen be first used, and then what is retained be again screened, and the process repeated three or more times, sands and gravels of several different degrees of coarseness can be separated out. Further than this, gravel, like sand, can be washed if desired to free it from loam or clay; and an excellent washed gravel is often obtained in this way from brick earth, being separated out in the wash mill and sold as a bye-product.

GREEN BUILDINGS

Green buildings are those which is environment friendly, profitable, healthy places to live, work and learn. Uses minimum of non-renewable energy, produces minimum pollution, i.e. minimum use of resources with maximum comfort.

What is a Green Building? The concept of a green building was developed in the 1970s in response to the energy crisis and people's growing concerns about the environment. A Green Building, also known as a sustainable building, is a structure that is designed, built, renovated, operated, or re-used in an ecological and resource efficient manner.

A green roof is a roof of a building that is partially or completely covered with vegetation and a growing medium, planted over a waterproofing membrane. It may also include additional layers such as a root barrier and drainage and irrigation systems. The use of "green" refers to the growing trend of environmentalism.

The green building concept is gaining importance in various countries. These are buildings that ensure that waste is minimized at every stage during the construction and operation of the building, resulting in low costs according to

the experts in the technology. Green buildings are designed to reduce the overall impact of the built environment.

Cool roof system for buildings is a roofing system that can deliver high reflectance (the ability to the visible, infrared and ultraviolet wavelength of the sun, reducing heat to the building) and high thermal emittance (the ability to release a large percentage of absorbed, or non-reflected, solar energy) is a cool roof.

The selection of green building materials and products represents one important strategy in the design of a green building. Green building materials offer specific benefits to the building owner and building occupants.

Knowing Green Building materials is an important step in designing a green building to be more efficient and energy saver. Green Building Materials list is presented here.

Site and Landscaping for Green Building: The purpose of sustainable site planning is to integrate design and construction strategies by modifying both, the site and building to achieve greater human comfort and operational efficiency. It ensures – Minimum Site disruption. Maximum usage of microclimate features. Appropriate landscaping.

Green buildings around the world uses natural sources of energy, lighting, ventilation, temperature control etc and make building environment friendly.

What is LEED certification? In the United States and in a number of other countries around the world, LEED certification is the recognized standard for measuring building sustainability. Achieving LEED certification is the best way for you to demonstrate that your building project is truly “green.”

CONCRETE DURABILITY

Achieving Durability of Concrete Structures: The durable concrete structures are to be conceptualised, specified, designed, contracted, constructed and maintained. To achieve the design life of the structure at reasonable maintenance cost, the following aspects are required to be taken care of: The structure should also be designed for environment loads.

Causes of Concrete Failure Corrosion is not the only source of failure. Many other sources cause deterioration on reinforced concrete structures; this must be kept in mind and understood well when an inspection is undertaken. These sources of failure include:

1) Unsuitable materials
2) Unsound aggregate
3) Reactive aggregate
4)Contaminated aggregate.

Common design and detailing errors in construction arises due to either inadequate structural design or due to lack of attention to relatively minor design details. These types of design errors are discussed below: inadequate structural

design due to inadequate structural design the concrete is exposed to greater stress than it can handle or strain.

There are five levels of environment exposure of concrete for which durability requirements of concrete depends. These are: Mild exposure Moderate exposure Severe exposure Very severe exposure, and Extreme exposure. These are the environments to which the concrete will be exposed during its working life.

Chloride Attack on Concrete Structures: Chloride attack is one of the most important aspects for consideration when we deal with the durability of concrete. Chloride attack is particularly important because it primarily causes corrosion of reinforcement. Statistics have indicated that over 40 per cent of failure of structures is due to corrosion of reinforcement.

The microstructure of concrete is such that it has capillary pores to the extent of 28%. The extent of pores depends upon quality of concrete and the presence of water at the time of mixing of concrete. Making more dense concrete with less water/cement ratio reduces the amount of pores.

As with any material, concrete will expand and contract as the temperature rises and falls. The size of movement depends upon the change in temperature and the coefficient of thermal expansion of concrete.

The corrosion of steel reinforcement is complex, but basically it is an electro-chemical reaction similar to that of a simple battery. The composition of mild steel varies along its length and potential anodic (more negatively charged) and cathodic (positively charged) sites can be set up at various points.

The durable concrete structures are to be conceptualized, specified, designed, contracted, constructed and maintained. To achieve the design life of the structure at reasonable maintenance cost.

SPECIFICATIONS FOR FAUNDATION DESIGN

Specifications for Design of footings as per IS 456: 2000. The important guidelines given in IS 456: 2000 for the design of isolated footings are as follows: Footings is designed to sustain the applied loads, moments and forces and the induced reactions.

Machine foundations are special types of foundations required for machines, machine tools and heavy equipments which have wide range of speeds, loads and operating conditions. These foundations are designed considering the shocks and vibrations (dynamic forces) resulting from operation of machines.

Wall footings are pad or spread and strip Footings. The basic purpose of this foundation is to spread the load over a larger area so that the soil is able to withstand the stress, and the safe bearing pressure is not exceeded.

Types of Pad Foundations Pad foundations are generally rectangular or square foundation to transfer load from structure to the ground. These are provided at shallow depth and are shallow foundations.

Reinforced concrete foundations are designed based on column loads and moments at base and the soil data. Following are the types of foundations in order of preference with a view to economy: (i) Individual footings (isolated footing) (ii) Combined footings (combination of individual footings (iii) Strip footings with retaining wall acting as strip beam.

The following general requirements of machine foundations shall be satisfied and results checked prior to detailing the foundations. 1. The foundation should be able to carry the superimposed loads without causing shear or crushing failure. 2. The settlements should be within the permissible limits. 3. The combined centre of gravity of machine and foundation.

The blanket raft foundation is a curst raft constructed on a stone blanket, which is built up in layers on the reduced sub-strata level. The basis of the action and design of the foundation is a composite action between the crust raft and the stone blanket.

DESIGN OF FOOTINGS – IS-456 RECOMMENDATIONS: GENERAL 1. In sloped or stepped footings, the effective cross – section in compression shall be limited by the area above the neutral plane, and the angle of slope or depth and location of steps shall be such that the design requirements are satisfied at every section.

Design Considerations: If the loads transmitted by the columns in a structure are so heavy or the allowable soil pressure so small that individual footings would cover more than about one-half of the area, it may be better to provide a continuous footing under all columns and walls.

PORTLAND CEMENT (STUCCO)

Traditional Portland cement plaster (stucco) is a time-tested exterior finish. It consists of Portland cement-based materials and sand, mixed with water to form a workable plaster. Portland cement, the same material that is the basis for the hardened properties of concrete used to build super-highways, bridges, and skyscrapers provides strength, durability, and toughness in Por Portland cement plaster is applied either by hand or machine to exterior and interior wall surfaces in two or three coats. It may be applied directly to a solid base such as masonry or concrete walls, or it can be applied to a metal lath attached to frame construction, solid masonry, or concrete construction. Applied directly to concrete masonry, Portland cement plaster provides a tough 1/2-inch thick facing that is integrally bonded with the masonry substrate. When applied to metal lath, three coats of plaster form a 7/8-inch total thickness. A vapor-permeable, water-resistant building paper separates the plaster and lath from water sensitive sheathing or framing. Portland cement plaster has high impact resistance, sheds water, but breaths, allowing water vapor to escape. It’s a proven system that works in all climates.

Traditional Portland cement stucco provides a tough exterior that resists attack from woodpeckers to weed whackers. That inherent toughness is beautifully complemented by the variety of colors and textures available. Appearance is an important consideration in selecting a wall cladding. You can select a color and texture consistent with the message and image you wish to convey.

Color is determined by selecting cement and aggregate color, and quite often modified by adding mineral oxide pigments to the plaster mix. In many areas, factory-prepared finish-coat products are available. Pre-pigmented packaged cements also can be used to achieve the desired stucco color or pre-weighed mineral oxide pigments can be added to the finish coat stucco during mixing.

Texture is achieved by selecting aggregate size, controlling finish mix consistency, and using special treatment techniques during and after application of the finish coat plaster. Texture gives substance and character to the plaster surface. It can be used to provide highlights, depth, continuity, segmentation, and even achieve the look of a completely different construction material such as wood timbers, brick, or stone masonry construction. To confirm the suitability of a desired color and texture, be sure to ask your plasterer to provide a sample panel for evaluation prior to starting work.

Portland cement plaster has a well documented history of proven performance in extreme climates from the desert southwest of Arizona, to the severe winters of Minnesota, to the hot-humid Florida summers. It performs in all climates.

That durability is complemented by its versatility. Portland cement plaster provides an ideal finish or cladding for any building construction system including concrete, concrete masonry, brick masonry, wood frame, or steel frame. Portland cement stucco can be applied to any flat or curved surface either inside or outside.

Portland cement plaster (sometimes called traditional stucco) should not be confused with the exterior insulation and finish systems (EIFS) or synthetic stucco systems that have become popular but more recently have been the subject of controversy as a result of performance problems, including water leakage and low impact resistance.

Synthetic stucco consists of a polymer based laminate that is wet-applied, usually in two coats, to rigid insulation board that is fastened to the wall with adhesive, mechanical fasteners, or both. Polymer based (PB) systems, sometimes known as thin coat, soft coat, or flexible finishes, are the most common. The base coat for PB systems is usually only 1/16 in. thick and finish coat thickness is typically no thicker than the maximum sand particle size in the finish coat.

While the PB skin repels water very effectively, problems arise when moisture gets behind the synthetic stucco and is trapped inside the wall. Trapped moisture eventually rots insulation, sheathing, and wood framing. It also

corrodes metal framing and metal attachments. There have been fewer problems with EIFS used over solid bases such as concrete or masonry because these substrates are very stable and are not subject to rot or corrosion.

Polymer modified mineral based (PM) exterior insulation and finish systems are sometimes known as thick coat, hard coat, or rigid finishes. The mineral base is Portland cement, while the polymer is usually an acrylic. PM systems have greater impact resistance than the PB systems, but are typically less than 1/3 the thickness of traditional three-coat stucco.

STRUCTURAL CHARACTERISTICS

Internally, beams experience compressive, tensile and shear stresses as a result of the loads applied to them. Typically, under gravity loads, the original length of the beam is slightly reduced to enclose a smaller radius arc at the top of the beam, resulting in compression, while the same original beam length at the bottom of the beam is slightly stretched to enclose a larger radius arc, and so is under tension. The same original length of the middle of the beam, generally halfway between the top and bottom, is the same as the radial arc of bending, and so it is under neither compression nor tension, and defines the neutral axis (dotted line in the beam figure).

Above the supports, the beam is exposed to shear stress. There are some reinforced concrete beams that are entirely in compression. These beams are known as prestressed concrete beams, and are fabricated to produce a compression more than the expected tension under loading conditions. High strength steel tendons are stretched while the beam is cast over them. Then, when the concrete has begun to cure, the tendons are released and the beam is immediately under eccentric axial loads. This eccentric loading creates an internal moment, and, in turn, increases the moment carrying capacity of the beam. They are commonly used on highway bridges.

The primary tool for structural analysis of beams is the Euler-Bernoulli beam equation. Other mathematical methods for determining the deflection of beams include "method of virtual work" and the "slope deflection method". Engineers are interested in determining deflections because the beam may be in direct contact with a brittle material such as glass.

Beam deflections are also minimised for aesthetic reasons. A visibly sagging beam, though structurally safe, is unsightly and to be avoided. A stiffer beam (high modulus of elasticity and high second moment of area produces less deflection. Mathematical methods for determining the beam forces (internal forces of the beam and the forces that are imposed on the beam support) include the "moment distribution method", the force or flexibility method and the matrix stiffness method.

REINFORCED CONCRETE STRUCTURES PROTECTIVE SYSTEMS

Protective systems consist of materials and methods that provide the following protective qualities:

a) Reduction in chances of corrosion of steel reinforcement.

b) Less deterioration of the concrete.

c) Less penetration of moisture, chloride ions, and other contaminants into the concrete. This can be achieved by providing surface treatments, applying electro-chemical equipment, or by modifying the PCC overlay.

d) More abrasion or impact resistance.

e) More resistance to other deleterious attacks.

The objective of providing a protection system is to extend the life of the structure and to reduce the number of future repairs and the rate of deterioration of the concrete structures. The following factors are considered while suggesting a protective system:

1. Life-cycle costs are compared for the various protection systems applicable for a particular situation. The protection system with the lowest initial cost may actually be the most expensive when the costs of future repairs are added over the projected life of the structure.

2. In case the protection system has a previous performance record, the confidence in its use increases.

3. Appearance can sometimes be an important factor in determining the selection of a system.

4. Thorough supervision, testing and visual observations must be made during the installation of the protection system.

5. The noise and dust levels, handling, use, and disposal of hazardous chemicals and escape of vapors into air must be considered while deciding the protective system. Further, local environmental laws must be observed.

6. The bond of the new protective system applied on existing structure or earlier repair material must be studied.

7. The expected life of a system against the exposure to prevailing atmospheric conditions must be considered.

8. There must not be any serious medical problems for the working people and chances of failure during repair work.

CONSTRUCTION EQUIPMENT

Power shovel – экскаватор

OSHA – Occupational Safety and Health Act – Закон о технике безопасности и гигиене труда США

guidelines – нормативы

All equipment employed in the concrete crack repair operation must be inspected before, during, and after the repair project to ensure proper operation of the equipment, safety of the personnel involved in the project, and potential damage to the pavement due to equipment problems. Proper safety procedures must be in accordance with OSHA guidelines and common sense.

How to choose right equipment for construction? Most of the construction projects involve laborious work which is to be handled by men and the equipment designed for doing the work undersigned. It is difficult for workers to accomplish all things in a project and so there comes the need for machines particularly the construction machinery.

Construction Equipments the selection of the appropriate type and size of construction equipments often affects the required amount of time and effort and thus the job-site productivity of a project. It is therefore important for site managers and construction planners to be familiar with the characteristics of the major types of equipment most commonly used.

Power shovel is construction equipment whose value is to excavate the earth and load it into the trucks or other hauling equipment waiting nearby. They are capable of excavating all classes of earth, except the solid rock without prior loosening. The basic parts of a power shovel consists of the mounting (crawler track or rubber tyred wheel), cab, boom, dipper stick, dipper and hoist line.

Since concrete contains particles of varying sizes, the most satisfactory compaction would perhaps be obtained by using vibrators with different speeds of vibration. Polyfrequency vibrators used for compacting concrete of stiff consistency are being developed. The vibrators for compacting concrete are manufactured with frequencies of vibration from 2800 to 15000 rpm. It essentially consists of a steel tube (with one end closed and rounded) having an eccentric vibrating element inside it. This steel tube called poker is connected to an electric motor or a diesel engine through a flexible tube. They are available in size varying from 40 to 100 mm diameter. The diameter of the poker is decided from the consideration of the spacing between the reinforcing bars in the form-work.

The frequency of vibration varies upto 15000 rpm. However a range between 3000 to 6000 rpm is suggested as a desirable minimum with an acceleration of 4g to 10g.

The normal radius of action of an immersion vibrator is 0.50 to 1.0m. However, it would be preferable to immerse the vibrator into concrete at intervals of not more than 600mm or 8 to 10 times the diameter of the poker.
The period of vibration required may be of the order of 30 seconds to 2 minute. The concrete should be placed in layers not more than 600mm high.

HOW MODERN AIR CONDITIONING WORKS

Air conditioning a building has actually been in practice for centuries. In Ancient Roman society evidence has been found to show us that the residents would circulate water from the aqueduct throughout the walls in buildings to cool the interior. Modern day air conditioning has come a long way from water circulation in walls although currently we retain the same philosophies.

In 1902 Willis Haviland Carrier invented the first electric air conditioner for large buildings. His namesake would remain on certain models even to this day. The concept behind the operation of air conditioning a room or building is the same, while different models may operate a bit differently. There are window air conditioners that fit inside the window resting on the sill, rooftop units, ground units, geothermal units, and cooling towers just to name a few types.

Depending on the size of the area you wish to cool you may see anywhere from a single unit to multiple units used. When you get down to the bare nuts of the unit, you will find that an a/c works much like a refrigerator within an insulated box. When Freon evaporates it will provide the cooling. The evaporation cycle works like this: the compressor will cool the Freon gas which actually turns the gas hot; the hot gas will run through coils to get rid of the heat and it is condensed into liquid; the Freon liquid goes through an expansion valve while evaporating and the cold gas will go through coils that will let the gas absorb the heat and cool down the air.

Did you get that? In other words, every air conditioning unit will have a compressor to compress gas, an expansion valve so that the gas doesn't explode, hot and cold coils, fans and of course a controller so you have the ability to turn it on and off. The fans will blow the air over the coils as they assist the coils in dispelling the hot air into the outdoors while helping the cool air spread further indoors. You will usually find the hot portion of an air conditioning unit outside while all things that cool remain inside the building. This holds true for a window, rooftop or ground level air conditioner.

When it comes to cooling towers it's a bit different. Cooling towers used the chilled water method to cool the air. These are usually found on a roof or behind a building. Water is cooled to 40-45ºF (4.4-7.2ºC) and is then sent along a piping system throughout the building and is connected to air handlers where required. Also be aware of the fact that barometric pressure and relative humidity play a great part in the effectiveness of a cooling tower's operation.

Portable air conditioning units work by way of cooled water being pumped in front of a fan for cooler air and some units allow for ice to be used as well.

You will find air conditioning units measured in BTUs and EER. The British Thermal Unit refers to the amount of heat needed to raise the temperature of a pound of water. Therefore a 1-ton air conditioner is 12,000 BTU. Window units are usually 10,000 BTU and a 5-ton unit for a decent sized

family home is 60,000 BTU. The Energy Efficiency Rating refers to the wattage of the units.

The bottom line in defining air conditioning states that indoor air is cooled and dehumidified through the use of coils, compressors and fans. Now, sit back and enjoy the weather!

CONCRETE ADMIXTURES

ADVERSE EFFECT OF CONCRETE ADMIXTURE

I. Read and translate the text using the following words:

adverse – неблагоприятный
improper – неправильное
application – применение
admixtures – примеси
judiciously – разумно
booster – усиленный
dosages – дозы
severe – тяжелый
retardation – торможение, задержка
segregation – расслоение
shrinkage – усадка, сжатие

Adverse effects due to improper application : admixtures are used extensively to produce high workable, high strength high performance and highly durable concrete with minimum cost. However, these admixtures are not used judiciously and with the poor knowledge of admixture among engineers at site results in the following adverse effect on concrete. Rapid slum loss: This effect general observed in rich mixes with higher cement content and it can be reduced by adding booster dosages at different intervals.

Severe segregation/bleeding : This is generally observed in lean mixes with low cement content and depends on dosage of admixture. This can be minimized either by reducing admixture dosage or by increasing content of fine in the concrete.

Over retardation : This effect a noticed when the admixture is added beyond the specified dosage and it would effect the construction schedule, result in low strength development at early age. However ultimate strength of the concrete remains same.

Plastic shrinkage : This is general observed in large floor slabs of this sections and due to excess evaporator of water from the surface of the concrete at high temperatures are continuous breezing. However the plastic shrinkage cracks are determental to structures.

CONCRETE CHEMICALS AND APPLICATIONS

Concrete Chemicals (Admixtures) and Applications Admixtures are materials other than cement, aggregate and water that are added to concrete either before or during its mixing to alter its properties, such as workability, curing temperature range, set time or color. Some admixtures have been in use for a very long time in concrete construction, such as calcium chloride to provide a cold-weather setting concrete.

Based on their functions, admixtures can be classified into the following five major categories:

1) Retarding admixtures
2) Accelerating admixtures
3)Super plasticizers
4) Water reducing admixtures
5) Air-entraining admixtures

Among other important admixtures that do not fit into these categories are admixtures whose functions include bonding, shrinkage reduction, damp proofing and coloring. The following paragraphs provides details on the above-mentioned categories of concrete admixtures.

Retarding admixtures slow down the hydration of cement, lengthening set time. Retarders are beneficially used in hot weather conditions in order to overcome accelerating effects of higher temperatures and large masses of concrete on concrete setting time. Because most retarders also act as water reducers, they are frequently called water-reducing retarders. As per chemical admixture classification by ASTM-ASTM C 494, type B is simply a retarding admixture, while type D is both retarding and water reducing, resulting in concrete with greater compressive strength because of the lower water-cement ratio.

Retarding admixtures consists of both organic and inorganic agents. Organic retardants include unrefined calcium, sodium, NH4, salts of lignosulfonic acids, hydrocarboxylic acids, and carbohydrates. Inorganic retardants include oxides of lead and zinc, phosphates, magnesium salts, fluorates and borates. As an example of a retardant's effects on concrete properties, lignosulfate acids and hydroxylated carboxylic acids slow the initial setting time by at least an hour and no more than three hours when used at 65 to 100 degrees Fahrenheit. The concrete contractor, however, need not memorize these chemical-specific results. Given the specific job requirements and goals, the concrete supplier should offer appropriate admixtures and concrete mixes from which to choose.

Accelerators shorten the set time of concrete, allowing a cold-weather pour, early removal of forms, early surface finishing, and in some cases, early load application. Proper care must be taken while choosing the type and proportion of accelerators, as under most conditions, commonly used accelerators cause an increase in the drying shrinkage of concrete.

Calcium chloride is a common accelerator, used to accelerate the time of set and the rate of strength gain. It should meet the requirements of ASTM D 98. Excessive amounts of calcium chloride in concrete mix may result in rapid stiffening, increase in drying shrinkage and corrosion of reinforcement. In colder climates, calcium chloride should not be used as an anti-freeze. Large amount of calcium chloride is required to lower the freezing point of the concrete, which may ruin the concrete.

Super plasticizers, also known as plasticizers, include water-reducing admixtures. Compared to what is commonly referred to as a "water reducer" or "mid-range water reducer", super plasticizers are "high-range water reducers". High range water reducers are admixtures that allow large water reduction or greater flow ability (as defined by the manufacturers, concrete suppliers and industry standards) without substantially slowing set time or increasing air entrainment.

Each type of super plasticizer has defined ranges for the required quantities of concrete mix ingredients, along with the corresponding effects. They can maintain a specific consistency and workability at a greatly reduced amount of water. Dosages needed vary by the particular concrete mix and type of super plasticizer used. They can also produce a high strength concrete. As with most types of admixtures, super plasticizers can affect other concrete properties as well. The specific effects, however, should be found from the manufacturer or concrete supplier.

Water reducing admixtures require less water to make a concrete of equal slump, or increase the slump of concrete at the same water content. They can have the side effect of changing initial set time. Water reducers are mostly used for hot weather concrete placing and to aid pumping. A water-reducer plasticizer, however, is a hygroscopic powder, which can entrain air into the concrete mix via its effect on water's surface tension, thereby also, obtaining some of the benefits of air-entrainment (see below).

Air-entraining agents entrain small air bubbles in the concrete. The major benefit of this is enhanced durability in freeze-thaw cycles, especially relevant in cold climates. While some strength loss typically accompanies increased air in concrete, it generally can be overcome by reducing the water-cement ratio via improved workability (due to the air-entraining agent itself) or through the use of other appropriate admixtures. As always, admixtures should only be combined in a concrete mix by a competent professional because some of them can interact in undesirable ways.

Bonding admixtures including addition of compounds and materials such as polyvinyl chlorides and acetates, acrylics and butadiene-styrene co-polymers, can be used to assist in bonding new / fresh concrete with old / set concrete.

Coloring agents have become more commonly used, especially for patios and walkways. Most are surface applied and often have the additional effect of surface hardening. Such surface applied coloring admixtures generally should

not be used on air-entrained concrete. Integrally colored concrete is also available.

Water proofing and damp proofing admixtures including soaps, butyl stearate, mineral oil and asphalt emulsions, are used to decrease the amount of water penetration into the larger pores of concrete. “Antifreeze” admixtures typically are accelerators used in very high doses, with a corresponding high price, to achieve a very fast set-time, though they do not have properties to protect against freezing on their own. However, in general, these are not used for residential work.

FACTORS AFFECTING CONCRETE ADMIXTURES PERFORMANCE

The various factors which affect the performance of concrete admixtures are:

1. Type of super-plasticizer: The admixture will be more effective if molecular weight of the super-plasticizer is high.

2. Dosage: The quantity of admixture should be optimum. Excess of admixture may cause segregation or bleeding. It may also cause excessive retardation. The optimum does of admixture. The various factors which affect the performance of concrete admixtures are:

1. Type of super-plasticizer:

The admixture will be more effective if molecular weight of the super-plasticizer is high.

2. Dosage:

The quantity of admixture should be optimum. Excess of admixture may cause segregation or bleeding. It may also cause excessive retardation. The optimum does should be estimated by trials.

3. Compatibility with Cement:

All admixtures may not produce same results with different cements. Therefore before using any admixture, its compatibility with cement has to be established. Properties of cement like fineness, chemical-composition, C3A content etc. affect the performance of admixture. Therefore, trials have to be made before finalizing an optimum does of admixture.

4. Mix Design:

All constituents of mix affect the performance of the super-plasticizer as given below:

1) Water: more water in the mix improves the physical interaction and dispersion of admixtures.

2) Coarse aggregate: proportioning and grading of coarse aggregates influence the performance of concrete admixture.

3) Fine aggregate: proportioning, grading and silt content also influence the performance of concrete admixture.

4) Cement: its fineness, C3A content influence the performance of admixture. Higher C3A reduces efficiency of admixture.

5) Other admixture: presence of other admixtures also influences the performance of concrete admixtures.

Therefore, proper trials before actual use are very vital for effectiveness of admixture.

Other factors admixture performance are **temperature** and **humidity** at the time of concreting also affect the performance of the concrete admixtures.

Drum mixtures are considered ideal for mixing admixtures, instead we should use pan or compulsive shaft mixes.

STANDARD CODES FOR CONCRETE ADMIXTURES

Standard Codes for concrete admixtures: Admixtures used should conform to the following relevant standard codes. In reinforced concrete, the chloride ion of any admixture used should not exceed 2% by weight of the admixture as determined in accordance with IS:6925 and the total chloride ion in all admixtures used in concrete mi shall not exceed 0.83% by weight of cement. The addition of calcium chloride to concrete containing embedded metal will not be permitted under any circumstance.

Accelerating concrete Admixtures conforming to **IS: 9103 & 2645** should be used. It is in liquid state with a specific gravity of 1.3 and complying with **ASTM C-494** type E. It accelerates the setting and hardening of the concrete mix thereby achieving high early ago strength. Accelerating concrete admixture should be compatible with all types of cement.

Retarding concrete Admixtures conforming to **IS: 9103**. It is in liquid state with a specific gravity of 1.22 and complying with **ASTM C-494** type B&D, CRD-C87 type B & D, **BS: 5075** part 1. It should be added to the concrete mix during the mixing process along with water and aggregates. No extension of normal mixing time is necessary. It will delay the initial and final setting time and helps to spread the heat of hydration over a longer period of time. It gives a highly workable concrete with a low W/C ratio. It must be compatible with all types of cement depending on requirement.

Air-entraining Admixtures conforming to IS: 9103.

Water-reducing admixtures conforming to IS: 9103.

Integral waterproofing admixtures conforming to IS: 2645. It is used as an excellent cement admixture in all types of concrete/ plaster mortars, pointing mortars, masonry works, guniting works and pressure grouting works. It improves resistance of the surface to weathering and chemical attacks. It should not be toxic so as to use for waterproofing in water tanks, reservoirs, tanks, etc.

PROPERTIES AND FUNCTIONS OF CONCRETE ADMIXTURES

What are Concrete Admixtures? Ingredients other than cement, water, and aggregates that impart a specific quality to either plastic (fresh) mix or the hardened concrete (ASTM C496) is called concrete admixture. Why use Concrete Admixtures? 1. Reduce cost of concrete construction 2. Achieve specific concrete properties more effectively 3. Ensure quality of concrete during mixing.

Concrete admixtures are added to change the properties of concrete to make it function as required. Admixtures are used to modify properties of both fresh and hardened concrete as discussed below: Functions of admixtures to modify fresh concrete properties: a) To increase workability without increasing water content or to decrease the water content.

Accelerators increase the initial rate of chemical reaction between the cement and the water so that the concrete stiffens, hardens, and develops strength more quickly. They have a negligible effect on consistence, and 28-day strengths are seldom affected. Accelerating admixtures have been used mainly during cold weather when the slowing down of the chemical reacting.

Retarding water-reducing admixtures are chemicals that slow down the initial reaction between cement and water by reducing the rate of water penetration to the cement and slowing down the growth of the hydration products. The concrete therefore stays workable longer than it would otherwise. Shrinkage-reducing concrete admixture promote expansion of the concrete at about the same volume that normal drying shrinkage is contracting it. The net change in length of the hardened concrete is small enough to prevent shrinkage cracks. The typical materials used for shrinkage compensation in concrete are based on calcium sulfo-aluminate or calcium aluminate and calcium.

PART IV. TEXTS AND TASKS FOR HOME READING

Text 1

За 5 мин просмотрите текст, расскажите:
1) об основных видах цемента и различиях между ними,
2) о способах изготовления цементов,
3) о производстве и применении цемента в РФ.

CEMENT

The word cement comes from the Latin word “caementum" meaning pieces of rough uncut stone. There are two groups of cement: natural and artificial. Natural cement is made of nodules consisting of lime (30 per cent), clay (50 per cent) and oxides of iron (10 per cent). The main types of the artificial cement are:

1) Ordinary Portland cement,
2) Rapid Hardening Portland cement,
3) White and coloured Portland cement,
4) Portland blast-furnace cement,
5) High Alumina cement.

Portland cement is manufactured commonly by the wet or by the dry process.

RAPID HARDENING PORTLAND CEMENT

The manufacturing process is similar to that of normal Portland cement, the chief difference being in the degree of fineness in the grinding which results in a more rapid rate of gaining strength. This cement can he employed in cold weather.

WHITE AND COLOURED PORTLAND CEMENT

The general method of manufacture is again similar but china clay is used in making white cement in order to exclude iron oxides. White cement is more expensive than ordinary cement It Is used in places where the white colour is desirable.

PORTLAND BLAST-FURNACE CEMENT

This is a mixture of ordinary Portland cement and blast-furnace slag.

HIGH ALUMINA CEMENT

It is dark brown in colour. It contains about 40% of lime and alumina with about 15% of iron oxides. The main differences between all these cements are in setting time, rate of gaining strength and ultimate strength resistance to chemical action and colour.

The Russian Federation holds the first place in Europe and the second in the world for cement output.

Cement is now used for a great variety of purposes. It is used for all big structural buildings, for ornament works, engineering works, docks, ships, bridges, water towers.

Text 2

GENERAL PROPERTIES OF CEMENT

All types of cement shrink during setting. In a normal concrete the amount of this shrinkage will depend both on the proportion of cement in the mix and the quantity of mixing water employed. Provided enough water is present to enable the chemical action of setting to take place, then the smaller the amount of water the less shrinkage there will be. The type of aggregate used has an appreciable effect upon both the amount of water and the amount of aggregate that can be mixed with given quantity of cement. Strength and durability of concrete are linked properties in that they are both associated with the low water-cement ration. In addition to the proportion of cement and the water-cement ratio of a cement product, the method of curing will also affect the amount of shrinkage. Normally, the slower the drying the less shrinkage there will be. All cement products are liable to a considerable shrinkage during setting and hardening.

Закончите предложения соответственно тексту:

1. The amount of shrinkage in cement depends both on ... .
2. The smaller the amount of water ... .
3. The type of the aggregate has an effect upon both ... .
4. Both strength and durability are associated with ... .
5. The slower the drying... . .
6. The method of curing will also affect... .

Text 3

RAPID – HARDENING CEMENT

A rapid-hardening cement has been developed at the Cement and Tils factory. Its formula includes send and minerals which contain oxides of aluminium, iron calcium and magnesium.

The new cement sees much of its quality to the combination of minerals and the manufacturing process. The setting time of the new cement la about 40 minutes. In case of repair of a foundation, for example, the structure is ready inside 48 hours. The new cement makes it possible to fabricate reinforced

reinforced products of high strength in field condition. The new material will effect a considerable saving in materials.

Exercise 1. Найдите неправильное утверждение.

1. The formula of a rapid-hardening cement includes sand and minerals.
2. The setting time of the rapid-hardening cement is 5 hours.
3. The new cement makes it possible to fabricate reinforced concrete products in field condition.

Exercise 2. Укажите предложение, которое содержит информацию из текста:

1. This cement can be employed in cold weather.
2. It effects saving in materials.
3. The manufacturing process is similar to that of normal Portland cement.

Text 4

About 20 different types of cement are produced in the Russian Federation. Apart from ordinary Portland cement, the production of which amounts to 45% of the total for the country, the output of special purpose cements is continually expanding. The rapid increase in the use of precast and pre-stressed reinforced concrete evoked (вызывать) a demand for a rapid-hardening and high-strength cement. During the last decade the Russian cement industry has begun to produce hydrophobic cement.

Hydrophobic cement was developed by Russian scientists in 1948. It contains a small amount of special hydrophobic agent. Mortars and concrete made from this cement are easy to use.

Exercise 1. Найдите в тексте ответы на вопросы:

1. How many different types of cement are produced in the Russian Federation?
2. What types of cement are produced by our industry?
3. What is hydrophobic cement?

Text 5

THE STRENGTH OF CEMENT

The following is abstracted from a paper read before the Concrete Institute by Mr H.C. Johnson, 1913.

To many it is undoubtedly a fact that

a) The cheapest cement is the most economical to use.
b) Testing a cement with a “name” is unnecessary.

c) The value of fine grinding is not considered; even if its advantages are known. d) The paste tensile seven days' test is quite sufficient guide to a cement's value as a "binding" material.

These conclusions are erroneous.

From the results of his experiments the author drew the following conclusions:

That a good strength in paste is no indication of a good strength in concrete. That the best tests of a cement's value for reinforced concrete are mortar compression cured in water and air.

That standard of values for cement to be used in reinforced concrete work be raised by 25 per cent; engineers may then reasonably expect to be able to use 1000 lb.per sq.in. concrete instead of 600 lb.

That for a given expenditure on cement a first-class one will allow a saving, since there will be less cement to pay carriage on, less cement to handle, and less sacks to clean, tie up, and return.

That a given strength of concrete should be specified, instead of a given mix.

That cement should be sold by volume instead of by weight, and in bags containing I cu.ft., to allow of quicker and easier handling. These bags should be made of paper for preference, this being the common practice in the United States. Among the advantages paper bags have over canvas ones are - no time is lost in shaking out the cement; no cement is retained by the sacks; there is no return freight on empties; the packages are Better looked after in storage; and cement is kept in better condition.

Exercise 1.

1. What are the erroneous and the true conclusions on the strength of cement?
2. Should cement be sold by volume or by weight?
3. What are the advantages of paper bags?
4. How much cement should paper bags contain?

Text 6

CONCRETE

Usually the term "concrete" is used to describe a dense material composed of cement and aggregate mixed with water. The density of such a material and therefore many of its properties depends upon the density of the aggregate. There are two types of concrete:

l) dense concretes – composed of heavy aggregates,

2) light weight concretes – composed of light aggregates.

Recently another type of concrete has been developed in which all fine aggregate is omitted and only enough cement is used to coat the surface of the coarse aggregate. This is known as “no-fine” concrete. There are also “celluar” concretes made by using materials which foam or form gas during the mixing of concrete. These give a product of very light weight.

Exercise 1. Укажите предложение, которое содержит информацию из текста:

1. Concrete may now be considered the most important building material.
2. Careful attention should be given to the selection of cement, aggregate and water.
3. The density of concrete depends upon the density of the aggregate.

Exercise 2. Закончите предложения:

1. Dense concretes are composed of …
2. Light weight concrete are composed of…
3. In “no-fine” concrete all fine aggregate is omitted and cement is used to …
4. “Celluar” concretes are made by using….

Text 7

Concrete is referred to as one of the most important materials. Mass concrete (монолитный бетон) was employed by the Egyptians and the Romans but the use of steel reinforcement did not begin until the 19th century of our era.

We live and work in concrete structures, drink water which is brought to our houses through concrete pipes. Concrete is a mixture of cement, sand and crushed stone, made into a paste with water. It forms a hard, durable mass and is used, largely for the foundations and walls of houses and for structures under water.

Выберите правильный ответ:

1. When was mass concrete used for the first time?

a) It was employed by the Egyptians and Romans many centuries ago.

b) It began to be used only in the 20th century.

2. The steel reinforcement began to be used by builders in the 19th century, isn’t it?

a) Yes, it is.

b) No, it Isn’t.

3. Is concrete a durable building material?

a) Yes, it is.

b) No, it isn’t.

4. For what purposes is concrete largely used now?

a) It is largely used for door and window frames.

b) It is widely used for the foundations and walls of houses.

Text 8

Прочтите текст за 3 минуты, подберите к нему заголовок из данных ниже и передайте содержание текста по-русски:

1. Building Materials.
2. Tower Cranes on the Continent.
3. Concrete construction in Britain.

Great Britain is a head of the most Continental countries in the application of concrete. They have learned to apply concrete skillfully and efficiently. This was largely due to conditions of labour and the supply of materials peculiar to Britain. In the constructional field they are making greater use of tower cranes, which were imported from the continent, but much continental equipment was unexploited because the cranes, for instance, are too light. British cranes are stronger and are used to speed up and simplify building operations. owing to the shortage of labour, more use was. made of precast components including building frames. There is, however, a trend towards lighter precast concrete panels such as these developed in France and Switzerland and lightweight precast floor units as used in Switzerland.

Exercise 1. Найдите в тексте эквиваленты следующим русским словам и словосочетаниям:

1. условия труда
2. ускорить строительство
3. применять умело и эффективно
4. запасы материалов

Text 9

Просмотрите за 2 мин. текст и расскажите по-русски, о чем он.

PROPORTIONING THE CONSTITUENTS OF CONCRETE

Devices for the measurement of moisture content of materials can, with an additional mechanism, be used for the automatic addiction of water into a concrete mixer. Variations in the moisture content of sand and coarse aggregate can be taken into account by means of special mechanisms attached to the valve regulating the supply of the mixing water. This procedure ensures greater uniformity of mixture and ultimately a better concrete product.

Text 10

CONTROL OF QUALITY OF CONCRETE

Radiation methods will not determine the strength of concrete directly but, since the lack of compaction results in a lower density as well as in lower strength, a correlation can be obtained between the strength and the coefficient

of absorption for given conditions. Such control is doubtly significant. The determination of zones of weakness gives a measure of the reduction in cross-section. At the same time, a picture of the distribution of density in the structural member makes it possible to estimate the accuracy of the assumptions. The method is used mainly for the control of reinforced precast concrete.

One instrument comprises a frame which supports the source and counter and enables these to be moved in two directions mutually at right-angles; control is by means of a special mechanism. Another instrument is used for the automatic control of components precast in a factory, and a similar instrument has been constructed for the control of concrete pipes. The latter device comprises a ring which moves ever the pipe and contains a strong gamma-ray source of 50 millicuries at one point and a number of Geiger counters distributed around the ring.

Exercise 1. Найдите в тексте и переведите на русский язык существительные, образованные от глаголов:

to compact – уплотнять
to correlate – приводить в соответствие
to absorb – поглощать
to determine – определять
to reduce – уменьшать
to distribute – распределять

Exercise 2. Найдите в тексте ответы на вопросы:

1. What instruments are used for the control of quality of concrete?
2. What method is used for the control of reinforced precast concrete?

Text 11

Переведите заголовок текста, просмотрите текст за 2 мин. И объясните, для чего нужны предлагаемые методы

COMBINED APPLICATION OF GAMMA RADIATION AND ULTRASONIC METHODS FOR CONCRETE QUALITY CONTROL

From the relationships of the basic of the ultrasonic method of concrete control it is known that the pulse-velocity of ultrasonic waves is, in general, dependent on three variables, namely, modulus of elasticity, density and the shapes of the object. Various combinations of these variables can give the same value of the pulse-velocity. For this reason, two of the variables must be known if the results are to be comparable. As density or thickness can be measured by gamma-ray devices, a combination of ultrasonic and gamma-radiation methods can provide more complete information regarding the quality of concrete.

Text 12

MOISTURE CONTENT

For the purpose of determining the moisture content of a material, gamma-rays or the phenomenon of the scattering of neutrons can be utilized (neutron moderation). The possibility of determining the attenuation of gamma-rays rests on the fact that the coefficient of absorption is proportional to the moisture content. If, in the period between the two measurements, the material has not changed its size, then the change of intensity of radiation can only be due to a change of moisture content. In practice the formula used is

$$d1=d0+p:100$$

where d1 = density of moist material, d0 = density of dry material, p = moisture content.

Therefore, for the determination of the moisture content it is necessary to know the density of the dry material.

I g. per cubic centimetre (specific gravity = I) is about 2 per cent.

The neutron method is based on the slowing down of fast-moving neutrons by collision with the collision of the hydrogen In the moisture. The measuring apparatus consists of a source of fast neutrons and special counters reacting only to slow neutrons. The number of neutrons registered in a unit of time is proportional to the moisture content. The arrangement can be used for solid, plastic and granular materials, that is concrete, clay bricks, and the like.

Exercise 1. Найдите в тексте английские эквиваленты следующим русским предложениям:

1. Если за период между двумя измерениями материал не изменился по размеру; то изменение интенсивности излучения может произойти только из-за изменения содержания влаги в нем.

2. Для определения содержания влаги необходимо знать плотность сухого материала.

3. Количество нейтронов в единицу времени пропорционально содержанию влаги.

Exercise 2. Соедините подходящие по смыслу части:

1. The neutron method is based on the slowing down of ….

a) solid, plastic and granular materials.

b) fast – moving neutrons by collision with the nuclei of the hydrogen in the moisture.

c) moisture content of a material.

2. The measuring apparatus consists of …

a) the phenomenon of the scattering of neutrons.

b) the fact that the coefficient of absorbtion is proportional to the moisture content.

c) a source of fast neutrons and special counters reacting only to slow neutrons.

Text 13

Прочтите текст и скажите: 1) каким образом определяется равномерность бетонной кладки; 2) в каких случаях было применено устройство, описание которого дано в тексте.

CONTROLLING THE UNIFORMITY OF FRESHLY-MIXED CONCRETE

When casting concrete it is useful to know how uniformly the concrete has been placed so that unsatisfactory compation can be corrected. A diagrammatic sketch of a device used for the quality control of concrete in the construction of a dam is shown in Fig.I. source 60 degrees or 137 degrees C of an activity of 5 millicuries is situated at the end of the probe which is inserted in the concrete. Radiation is measured on the surface of the concrete at a fixed distance from the source. The scale of the registering device is calibrated in units of density. By means of this instrument, the concrete can be tested immediately after placing. The operator decides quickly whether inferior concrete has been placed, either due to faulty proportioning or unsatisfactory compaction. In one case it was reported that during the construction of a dam where heavy aggregate was used, in some places the concrete tended to segregate in layers; by use of the instrument, any faulty material was detected and corrected. In other cases, when concrete of low workability was used, positions where the compaction was insufficient were detected and revibration was applied to the concrete before the final set.

The uniformity of concrete in a structure, which determines the quality of construction, can be determined from curves showing the distribution of the density of the concrete in a given structural member. Also the optimum distribution of vibrators can be determined for a given concrete. The method is especially suitable for massive structures.

Прочтите текст за 2 минуты, озаглавьте его и расскажите о требованиях к перевозке сборных элементов.

When precast units are transported to the site, care should be taken to avoid excessive stress. The castings should not be subjected to shock or impact.

The position of fitting points should be clearly defined. When necessary, fitting eyes, bolt holes or projecting loops should be provided.

During transportation and storage, packing at points of support should be provided in order to avoid stress for which the casting has not been designed, otherwise breakage may occur.

The material used for packing should be such as not to discolour and disfigure the casting.

Stacking should be arranged to prevent the accumulation of rubbish and water, particularly during cold weather.

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VOCABULARY

acrylic resin – акриловая синтетическая смола,
adamant – твердый минерал или металл,
additive – примесь, добавка к топливу,
adhesion – прилипание, сцепление,
adhesive – липкий, клейкий, связывающий,
adjacent – примыкающий, смежный, соседний,
adjust – приспосабливать, устанавливать,
admixture – примесь, смешивание,
adobe – необоженный кирпич, саманная / глинобитная постройка,
afterwards – впоследствии, потом, позже,
aggregate – агрегат, собирать,
airtight – герметический,
alternating – переменный,
amount – количество, сумма,
anhydrite – ангидрит *(минерал класса сульфатов, поглощая воду, переходит в гипс)*,
anhydrous – безводный,
Apollo – Аполлон *(в греческой мифологии сын Зевса, покровитель искусств, изображался прекрасным юношей с луком или кифарой),*
archaic – архаический, устаревший,
armature – арматура,
artisan – ремесленник, мастеровой,
asbestos – асбест *(минерал класса силикатов, материал для огнестойких и теплоизоляционных изделий),*
assemble – собирать,
assume – принимать форму,
attach – прикреплять, придавать,
available – доступный,
Babylon – Вавилон *(древний город в Месопотамии),*
bandage – бинт, перевязывать,
barrel – баррель *(мера жидких, сыпучих и некоторых твердых материалов),*
batch – пачка, кучка,
bead – шарик, бусинка,
beaver-tail – бобровый хвост,
bed – настилать, класть на надлежащее основание,
benefit – выгода, польза, прибыль,
binder – связующее вещество,
bleaching powder – белильная / хлорная известь,
blend – смесь, переход одного цвета или оттенка в другой,

bubble – пузырь, пузырек,
bulky – большой, объемистый,
calcine – кальцинировать, пережигать или превращать в известь,
calcium – кальций,
capture – захватывать, поглощать,
carbonate – углекислая соль, карбонат,
cast – форма для отливки, гипсовый слепок,
ceiling – потолок,
cement – цемент,
ceramics – керамика, гончарное производство,
chapel – часовня,
chip – обломок, щебень,
chisel – резец, долото,стамеска, зубило,
circumstance – обстоятельство,
coating – слой, шпаклевка, грунт,
collapse – обвал, разрушение, продольный изгиб,
composite – смесь, составной, сложный,
concave – вогнутый, впалый, впадина, свод,
concrete – бетон,
contamination – загрязнение,
contour – контур, очертание, абрис,
convert – превращать, переделывать,
convex – выпуклый,
Corinthian – коринфский (ордер),
covering – оболочка, облицовка, настил, покрытие,
cracking – крекинг,
craftsman – мастер, ремесленник,
cure – вулканизация (резины),
curing – консервирование, заготовка,
curve – кривая, изгиб, гнуть,
dazzle – ослеплять, маскировать,
decrease – уменьшение, спад,
dehydration – обезвоживание,
delft – (дельфтский) фаянс,
density – густота, плотность,
depict – рисовать, изображать,
deposit – осадок, месторождение,
depression – снижение, падение, вакуум,
destruction – разрушение, уничтожение,
detector – индикатор,
dextrin – декстрин,
dilute – разжижать, разбавленный,
dimple – впадина,

disperse – рассеивать, разбрасывать,
drill – сверло, сверлить, бурить,
duct – трубопровод, труба,
durability – прочность, долговечность,
duration – продолжительность,
earthenware – глиняная посуда, керамика, глиняный,
elaborate – тщательно разработанный, разрабатывать,
eliminate – устранять, исключать, очищать,
embed – вставлять, врезать,
emerge – появляться, всплывать,
emphasize – подчеркивать, акцентировать,
employ – употреблять, применять,
enable – создавать возможность, облегчать,
encaustic tile – разноцветный изразец,
endurance – прочность, длительность,
engraving – гравюра, гравирование,
enhance – увеличивать, повышать,
ensemble – ансамбль, общее впечатление,
environment – окружающая обстановка,
equipment – оборудование, арматура,
ester – сложный эфир,
etch – гравировать,
evidence – основание, признаки,
evolve – развивать, выделять,
exclude – исключать,
expand – расширять, увеличивать в объеме,
extinguish – гасить, тушить, уничтожать,
fibre – волокно, нить,
finishing – отделка,
fireproof – несгораемый, огнеупорный,
flame – пламя, гореть,
floral – растительный, цветочный,
flush – прилив, краска, полный, наполнять,
fresco – фреска, украшать фресками,
fuse – плавка, плавить,
gauze – газ, металлическая сетка, дымка,
gentry – мягко, нежно,
glaze – глазурь, глянец,
glue – клей, клеить,
grating – решетка,
grease – смазочное вещество, смазывать,
grid – решетка,
grind – размалывание, молоть,

groove – желобок, паз,
grout – жидкий раствор, заливать раствором,
gypsym – гипс,
haft – черенок, рукоятка, ручка,
hallway – коридор, прихожая,
harden – твердеть, застывать,
hardness – твердость, прочность,
hazard – риск, опасность,
hip – конек, ребро крыши,
hone – точить, хонинговать,
hydroxide – гидроокись, гидрат окиси,
imbrex – желобчатая черепица,
imperfection – недостаток, дефект,
impermeable – непроницаемый, герметический,
impregnate – наполнять, внедрять,
imprinting – импринтинг, отпечаток,
inhalation – вдыхание, ингаляция,
inhale – вдыхать,
interlock – соединять, сцеплять,
intermediate – промежуточный,
intumescence – распухание,
jamb – косяк (двери, окна), массив пустой породы,
joint – место соединения, стык,
kiln – печь для обжига и для сушки,
latex – латекс,
lath – планка, рейка,
laundry – прачечная,
layer – слой, пласт, класть пластами,
leaven – влиять,
length – длина,
liberate – освобождать, выделять,
lieu (in lieu of) – вместо,
limb – конечность, член (тела),
lime – известь,
limestone – известняк,
liquid – жидкость,
load – груз,
log – бревно, полено,
mason – каменщик, вести кладку,
masonry – каменная кладка,
masterpiece – шедевр,
mausoleum – мавзолей,
merely – только, просто,

merit – заслуга, качество,
mesh – петля, ячейка сети, сцеплять,
mix – смесь, смешивать,
mold (mould) – литейная форма, отливать в форму,
molten – расплавленный, литой,
mortise – паз, долбить,
mosque – мечеть,
mottle – крапинка, пятнышко, испещрять,
multiple – составной, многочисленный,
mural – стенной, отвесный, фреска,
Mycenaean period – микенский период,
nail – гвоздь, забивать гвозди, прибивать,
notably – достопримечательный, выдающийся, заметный, выдающийся человек,
obsolete – вышедший из употребления, устарелый, изношенный,
ornament – украшение, орнамент, украшать, быть украшенным,
orthopedic – ортопедический,
outlaw – человек находящийся вне закона, объявлять кого-либо вне закона, лишать законной силы,
overlap – частично покрывать, заходить один за другой, перекрывать,
palette – паллет, поддон, лопаточка, шпатель,
pantile – голландская черепица, конковая черепица,
paste – мастика, клей, клейстер, стекловидная масса, мятая глина,
patio – внутренний дворик,
patron – патрон, клиент,
pebble – голыш, галька, булыжник, мостить булыжником, посыпать галькой,
peel – четырехугольная башня на границе Англии и Шотландии,
permanent – постоянный, неизменный, долговременный,
permit – позволять, разрешать, допускать, разрешение,
pigment –пигмент,
pillar – столб, колонна, стойка, опора, подпирать, поддерживать,
pipe – труба, трубопровод, снабжать трубами, пускать по трубам,
pitch – разбивать , ставить, мостить брусчаткой, бросать, падение,
pit – яма, шахта, карьер, рыть ямы,
plain –ясный, очевидный, прямой,
plaster – гипс, алебастр, штукатурить, покрывать, подмешивать гипс,
ploughed field – вспаханное поле,
plywood – (клееная) фанера,
polystyrene – полистрол,
porcelain – фарфор, фарфоровый, фарфоровая глина,
porous – пористый, губчатое железо,
porosity –пористость,

pottery – глиняные изделия, фаянс,
powder – порошок, пыль, превращать в порошок,
precast – заводского изготовления, сборного типа,
precaution – предосторожность,
predate – произойти до какого-либо числа,
preliminary – предварительный,
prior – прежний, предшествующий,
prominent – выступающий, выпуклый, рельефный,
prone – распростерстый, покатый,
proprietary – частный, патентованное средство,
purification – очищение, очистка,
putty – замазка, шпатлевка, замазывать,
ramp – скат, уклон, наклонная плоскость,
rapidly – быстро,
rectangle – прямоугольник,
relatively – относительно, сравнительно,
release – освобождать, расцеплять,
removal – удаление, выемка,
resemble – походить, иметь сходство,
resilient – упругий, эластичный,
restrict – ограничивать,
retard – задерживать, тормозить,
revival – возрождение, восстановление,
ridge – конек (крыши), край, ребро,
riven – расколотый,
roast – обжиг, обжигать, кальцинировать,
roll – рулон,
rotary – вращательный, ротационный,
rough – неровный, шершавый,
rubber – резина, каучук,
sag – прогиб, свисать, покоситься,
sandblast – струя песка, обдувать песочной струей,
sandpaper – наждачная бумага,
saw – пилить, распиливать,
scanning – сканирование,
scratch – царапина, царапать,
seal – печать, клеймо, изоляция,
seamless – бесшовный,
secular – вечный,
sheeting – защитное покрытие,
shipment – отправка, перевозка товаров,
silica – кремнезем, кварц,
simulate – имитировать, подделывать,

simultaneous – одновременный,
sink – опускаться, проникать, оседать,
slab – плита, пластина, мостить плитами,
slaked lime – гашеная известь,
slate – сланец, шифер,
slippery – скользкий,
smooth – однородный, гладкий,
solar – солнечный,
solid – твердый, сплошной,
sophisticate – придавать утонченность, подделывать,
spot – пятно,
spray (sprayed) – пульверизатор, распылять,
sprinkle – брызгать,
stain – пятно, краска,
stonecutter – каменотес,
stoneware – керамические изделия, глиняная посуда,
strength – прочность, сопротивление,
strip – разбирать, демонтировать, полоса, лента,
sublimation – сублимация, очищение,
subsequent – последующий,
substantial – существенный, важный,
suitable – подходящий, соответствующий,
surface – поверхность, отделывать поверхность,
susceptibility – впечатлительность, восприимчивость,
tapestry – гобелен,
tax – подвергать испытанию,
tegular – черепичный,
temple – храм, прижимная планка,
tenon – шпилька, шип,
terminate – положить конец, завершаться, ограничивать,
terra cotta – терракота, терракотовый,
tesserae – кубик (в мозаике),
testament – завет,
thatched roof – соломенная крыша,
thickness – толщина, слой,
thigh – бедро,
thin – тонкий, прозрачный, тусклый,
tile – черепица, кафель, изразец, плитка,
tool – рабочий инструмент, резец,
toss – бросать, кидать,
transmit – передавать, отправлять,
travertine – травертин, известковый туф,
treatment – обработка, пропитка,

trowel – кельма, мастерок, разглаживать кельмой,
turquoise – бирюза, бирюзовый цвет,
ubiquitous – повсеместный,
usher – проводить,
utilize – использовать, утилизировать,
varnish – лак, лакировать,
vendor – продавец,
walkway – дорожка, аллея,
waterproof – водонепроницаемый,
wax – воск, вощить,
whitewash – известковый раствор, побелка,
widespread – широко распространенный,
width – ширина, пролет,
wire – проволока, связывать,
withstand – выдержать,
workshop – мастерская, цех,
yielding – мягкий, податливый.

C O N T E N T S

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ИНОСТРАННЫЙ ЯЗЫК.
АНГЛИЙСКИЙ ЯЗЫК
ДЛЯ ПРОФЕССИОНАЛЬНЫХ ЦЕЛЕЙ
ДЛЯ СТУДЕНТОВ-ТЕХНОЛОГОВ НАПРАВЛЕНИЯ
«СТАНДАТИЗАЦИЯ И МЕТРОЛОГИЯ»
Учебное пособие

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